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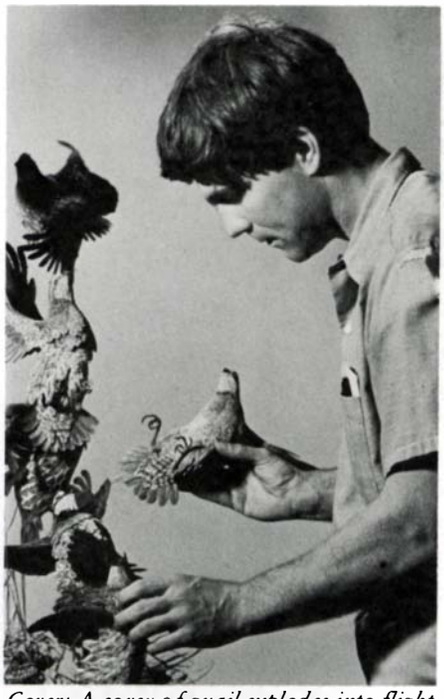

Cover: A covey of quail explodes into flight in this detail of a wood sculpture by Grainger McKoy; the whole sculpture is on page 79. Above, McKoy mounts one of the birds on its concealed steel ribbon. He describes this technique and other ways of making wood seem like living feathers in the article beginning on page 77. Photos: Ted Borg.

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DEPARTMENTS

ARTICLES

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Letters

John Lively's article about Rockwell and Powermatic *(FWW #30,* Sept.'81) was interesting yet frustrating. . . .Regardless of all that was said about customer service, quality control, curing of iron castings, despite the company spokesmen bragging about precision, neither firm seems able to make a flat saw-table any longer. I own machines from both companies that I bought new during the last three years. There is not room in a letter to list all the things wrong with them. Suffice it to say that I am not very happy with them. Comparing them to the same basic models sold 15 to 25 years ago to a friend of mine, the differences are readily apparent. There was more time and care devoted then. . . .

It is all very well for Rockwell to say they know that product quality suffered in the 70s, but what about the poor suckers who are stuck with the stuff and expired warranties? The people who relied on both of these companies' reputations and advertising? What good is a warranty or rapid parts replacement if the new part is as bad or worse than the one returned? And if I printed an owner's manual as full of stupid mistakes as that which Powermatic sent me with their 12-inch planer last year (a $2,600 machine), I would not have the nerve to say anything about operators not knowing how to set up their machines correctly. . . .

I for one would be quite willing to pay a bit more for a machine if that would ensure flat tables, straight fences, etc. . . . —*James L. Wheeler, Houston, Tex.*

Within a week of the time I sent you a letter about my service problems with Rockwell (with a copy to Bill Ramsey of Rockwell in Tupelo) I had a telephone call from Ramsey apologizing for the difficulties. He said that he had placed a number of calls to the main office, service organization, and distributor to ascertain how the ball had been dropped, and assured me that new wheels for my bandsaw were on the way by UPS direct from his plant.

Sure enough, two weeks later I received the two wheels, the fence screw for my jointer, and a new vibration-free belt to try on my bandsaw. They had made sure that the bandsaw wheels were well-balanced—there were 20 balance holes drilled in the one wheel and 21 in the other. And as to the "bottom-line"—my bandsaw now runs very smoothly.

—*John M. McCabe, Pittsford, N.Y.*

There has been interest in previous issues about the Gilliom bandsaw, so I thought I'd relate my experience with their drill press/lathe kit. I am an amateur woodworker who does not make his living from his hobby. The Gilliom kit appealed to me as a way to have both a drill press and a lathe at low cost, as well as to have the fun of building my own machine. Now certainly these are not tools of industrial or production quality, but I'm happy to improvise jigs and methods that extend and refine my tools.

Having used both the drill press and lathe regularly for several months, I am quite pleased with the results. The kit was enjoyable to build and seems sensibly designed. I used heavier lumber than called for and added glued joints to the bolt-together construction. The castings seem durable enough but not well finished so I had to dress them myself to render the headstock, which also serves as the carrier for the drill spindle, square to the lathe bed. The drill-press table, which travels on a rack-and-pinion mechanism, required some shimming to reduce play and to bring it square to the spindle. I'm not com-

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plaining, as I view these problems as opportunities for creativity on my part. Also, "close enough" is good enough....

— Steve Bien, Battle Creek, Mich.

Re *FWW* #31, p. 93: every spray gun has a warning never to use a glass jar such as your article advises. I blew the bottom out of a Binks aluminum container. Had it been a glass mayonnaise jar, you would have one less subscriber, for I could have been blinded or killed. *— Bill Bennett, Palm Springs, Calif.*

EDITOR'S NOTE: The De Vilbiss type EGA spray gun came with a glass jar as original equipment until OSHA required it to be replaced with aluminum. It operates on the suction principle, and the container is not pressurized. Problems with aluminum containers occur when chlorinated solvents are used under pressure. There is a reaction with the aluminum which can cause the container to burst.

The new liquid hand soaps are perfect for lubricating wood screws. A very small drop applied to the tip of the screw lubricates its whole thread. These liquids are really detergents, and not true soaps; they are neutral in reaction. The dispenser beats a dried-up cake of soap or a candle.

— David W. Carnell, Wilmington, N.C.

As your article correctly stated, stairbuilding has become a lost art with today's assembly-line methods (*FWW* #30, Sept. '81). Even in older homes with seemingly well designed and installed stairways, I often come across glue failure at the wedge and/or glue block location. Result: a most annoying squeaky stair. The horrible practice of face-nailing is then often resorted to, especially if the underside is not accessible. During my apprenticeship in Germany, it was standard practice to give each riser a ⅛-in. crown (on both square and rabbeted risers) before gluing into the tread above. Thus all treads are also slightly crowned and "sprung" just enough to prevent any squeaks. It also rules out the cause of cracking treads because the tight fit eliminates any space between riser and tread.

— Rolf Hedemann, Katonah, N.Y.

Re John Kelsey's suggestions to Charles Tamason about exposed dovetail joinery in box corners (*FWW* #31, Nov. '81, p. 32): Kelsey is in error suggesting the use of quartersawn lumber for this application. Refer to wood shrinkage tables and you find that the average hardwood's tangential shrinkage is about twice the radial shrinkage. In the context of box corners, this means that quartersawn wood, while more stable in width than planksawn, is going to change more in thickness than the planksawn.... Finishes do not reduce the movement of wood. They may slow the moisture transfer a little, but the total movement (winter to summer) will remain the same.

Re Richard Newman's response to Jim Smith's letter asking about 170 inlays for his pool table (*FWW* #31, pp. 28-30): Newman's method resembles using a sledge hammer to kill flies. Table saws and routers are completely unnecessary; sharp knives and chisels will do.

Take your mother-of-pearl square and glue it on a piece of paper. To cut the ⅛-in. ebony strips (black-dyed veneer of maple, sycamore, etc., is much easier to work and will fool all but the most astute antique appraiser—by the way, were the originals actually ebony?), clamp the veneer down on a board with the edge flush with the edge of the board and slice off strips with a cutting gauge. Then, glue a piece of veneer on your work board for support and slide the veneer strip up

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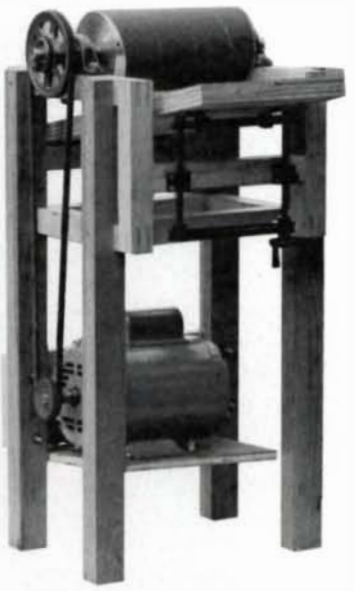

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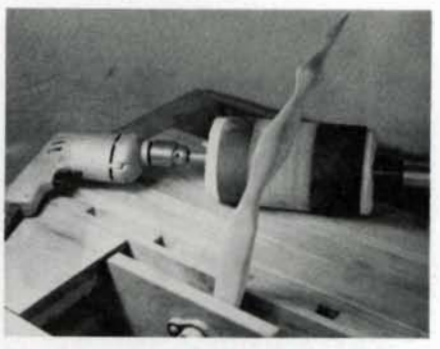

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against it. Using a very sharp chisel, cut your 45° angle on the end of a strip. A few pencil lines on the board are sufficient guide lines. Hold the strip against the mother-of-pearl inlay, mark and cut, then glue the piece down on the paper against the pearl. Do this 680 times and you have all your ebony/pearl inlay squares assembled on paper.

Trim the paper, turn over and mark out (using the square as a template) your mahogany veneer; cut a square hole in the mahogany veneer with a sharp chisel, glue in the inlay square using more paper backing, and then veneer the mahogany onto your pool table with the paper facing out. The paper is easily removed when you scrape/sand for finishing. This technique can be used for panels, stringing, cross-banding, etc.

—William Post Ross, Georgetown, Me.

I have a solution to the ongoing quest for the perfect glue spreader for yellow and white glues, a brush made from a 6-in. to 10-in. length of caning spline. With a hammer, beat the end of the spline until the fibers are splayed out for about ⅜ in., trim to shape and keep it in a container of water near your bench. When it begins to wear out, dig out your hammer again. For the price of a nickel, and since it wears out at the rate of an inch a year, it is very cost-effective....

How about some space devoted to woodworking anecdotes, or even short stories or poetry? Especially with a humorous nature. Maybe if readers would write descriptions of their worst disasters it would prove educational as well as humanizing.

—Brad Ansley, Atlanta, Georgia

I enjoyed the article on spindle laminations by Ted Pack (July '81). But he forgot to mention that this is a very old turners' technique used in the manufacture of furniture legs where large and small diameters are required in the same length. The multiple sandwich technique was the one most often used, and it was called post-blocking. The idea was to match the wood as close as possible and once the finish was put on, generally dark, it looked like one piece. I noticed this on several chairs in antique stores, and on some that came through the shop, where I hung out, for repairs. I started using this method some years ago on being frustrated in my attempts to find large, stable pieces of wood for turning, and eventually fell into using different types of wood in the layers. I would also suggest using combinations of oak, mahogany and walnut as well as any wood with pronounced rays that has been quartersawn; beech, oak and the like are especially attractive.

—John Wiznak, Victoria, B.C.

The Emmert Universal patternmaker's vise (mentioned in *FWW* #30, p. 75) is still being made. They were at one time made by Oliver, and they sold to Kindt-Collins Company, 12651 Elmwood Ave., Cleveland, Ohio 44111. They have changed the vise somewhat in that they now use a cam mechanism to change the angle of the jaws, instead of the screw that the old style has. The vise shipping weight is 150 lb. and at $845 is not cheap. *—Ted Eck, Anaconda, Mont.*

You may write about all your fancy powered wood kilns, from nuclear to thermal to gravity, but I have a simpler method. My house is heated with forced air. When I want to test if my wood is dry, I put the small pieces I will use into an air duct. If it checks, it checks, and if it doesn't, it doesn't. But it is quick, cheap and effective. *—Henry Fisher, Columbus, Ohio.*

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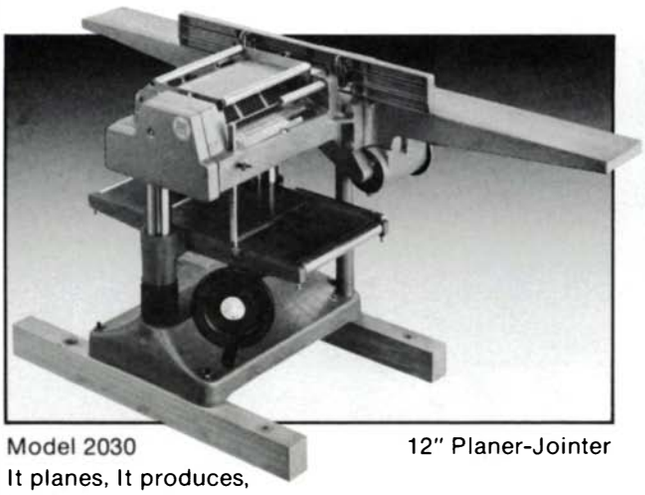

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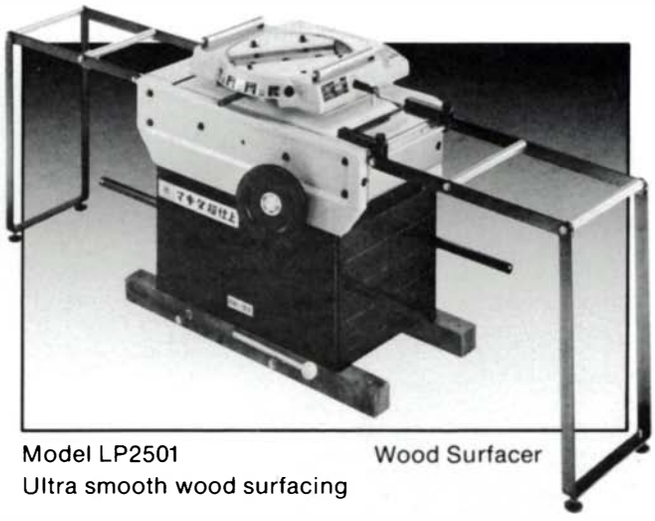

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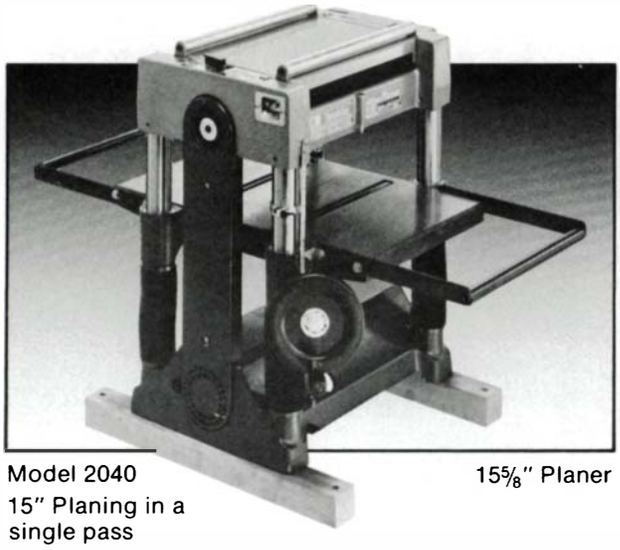

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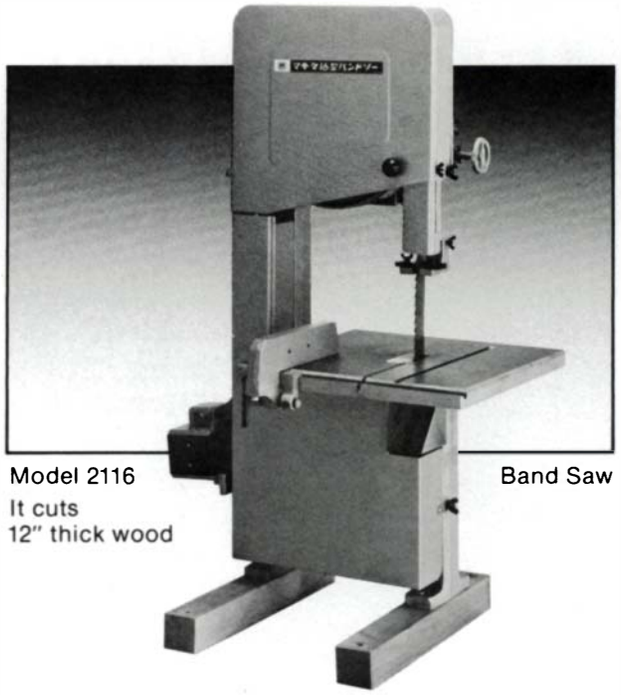

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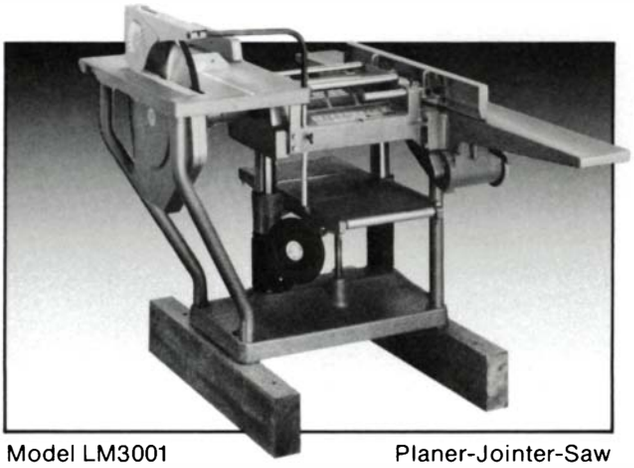

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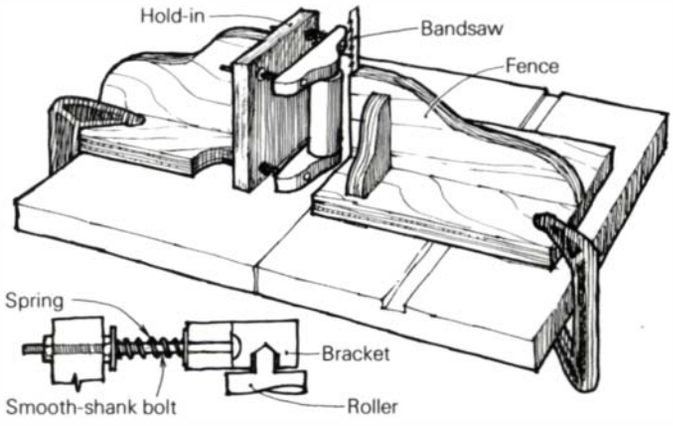
Roller hold-in for resawing

Before I built this roller hold-in, I found myself using one hand to hold the work against the bandsaw fence and the other to steer and feed the stock. I didn't feel balanced and comfortable, and my hands were too close to the blade at the end of the cut. The roller fixture that solved these problems cost me $2.50, two hours of work and two trips to the hardware store.

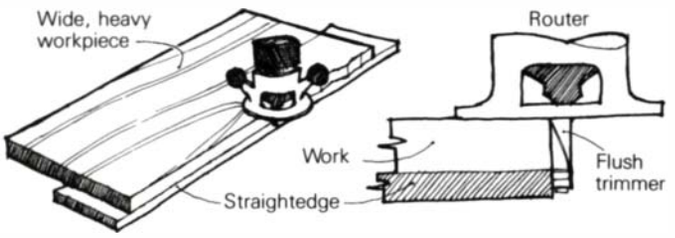
The fixture consists of a base, two roller brackets and a roller. I made the base from plywood and glued and screwed it together for strength. Be sure to make the base large enough so you can clamp it easily to both the back and side of the saw table. I cut the roller brackets and turned the roller from maple. My version of the roller is about 1¼ in. in diameter and 5½ in. long, an ideal size for my 8-in. resaw-capacity bandsaw. I turned the roller and the ½-in. axles as a single unit. An enhancement that I didn't include on my roller fixture would be to point the axle ends to provide a low-friction bearing where the axle runs in the brackets. Attach the roller brackets and roller to the base with bolts, washers and nuts as shown in the drawing. Be sure to use bolts with a smooth shank where they pass through the brackets, else the brackets will bind on the bolt.



To use the hold-in, set the fence in position for the proper thickness of cut. Now bring the roller fixture into position and clamp so the roller exerts the proper pressure and touches the work just forward of the blade. If you use the narrow-faced fence shown in the sketch it is important to plane the stock between each resaw, because the narrow contact tends to duplicate any waviness or imperfection in the face of the stock. Reset the roller hold-in after each cut to regain the proper hold-in pressure. —*Dennis LaBelle, Traverse City, Mich.*

Jointing wide planks

Here's a way to joint those monster wide planks that are impossible to true on a jointer no matter how strong you are. Clamp your raggedy edged board over a long, straight guide-stick and trim the edge square with a big (1½-HP, ½-in. collet) router fitted with a flush-cutting spiral trimmer. Position the workpiece to overhang the guide-stick slightly so the whole edge gets machined in one pass. With a hardboard template the same setup can be used to smooth contours. Ocemco (1232 51 Ave., Oakland, Calif. 94601) makes a dual-bearing, ½-in. diameter, flush trimmer with two spiral flutes that's ideal. The trimmer, which sells for about $30, is 1½-in. long, limiting its use to 6/4 stock.

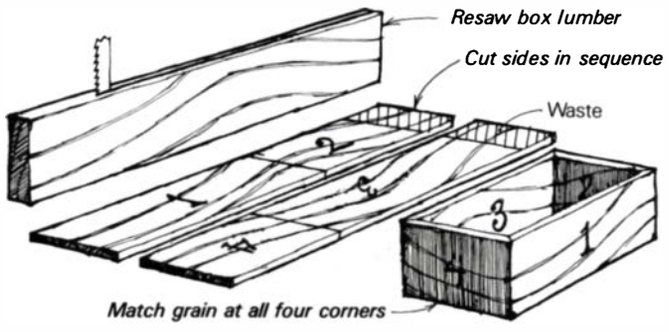


—*Patrick Warner, Escondido, Calif.*

Book-matched box

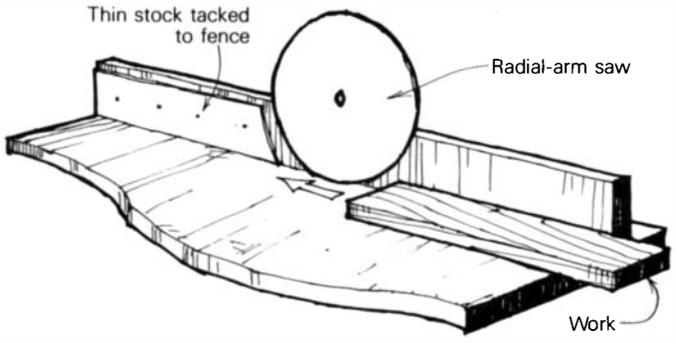
This simple book-matching technique yields a box with perfectly matched grain at all four corners. The system requires the rough lumber to be only as long as one side and one end of the box, but thick enough to resaw.

First resaw the box lumber. The inside surfaces match, so reverse them to become the outside of the box. Now cut the side and ends sequentially, keeping all the waste to one end as shown in the sketch. Assemble the box as you like. I prefer the dramatic matched effect of mitered corners,with spline reinforcements for strength. —*Sam Bush, Portland, Ore.*



Jointing on the radial-arm saw

Lacking a jointer here's an improvised radial-arm-saw setup I devised to joint the thick oak boards I used in two butcher-block tabletops. First rip a thin board the exact thickness of the saw kerf of the blade you're using. Tack the thin board to the saw fence behind the blade. Bring the blade up against the fence and adjust so that the blade and the piece you've added to the rear fence are flush. If your setup is accurate, your fence is long and straight and your blade has 60 or more carbide teeth, you should get perfectly jointed edges ready to be glued up. Using variations on this fence, you can joint on the table saw and router table as well. —*Dale Snyder, Duluth, Minn.*



Fixing jointer-knife nicks

If jointer knives get nicked as a result of hitting a nail or whatever, you can slide one knife a fraction of an inch to the right and another knife a little to the left. Leave the third knife in its original position. Because the nicks do not come in line, the jointer will surface lumber as smoothly as it did originally.

—*Eric Schramm, Los Gatos, Calif.*

I solve the problem of a deeply nicked jointer knife by keeping an extra set on hand and replacing only one nicked knife with one from the spare set. Replacing one knife at a time saves on setup time and extends the life of the knives between

sharpenings. Of course, all six knives should be sharpened at once, ground to the same size.

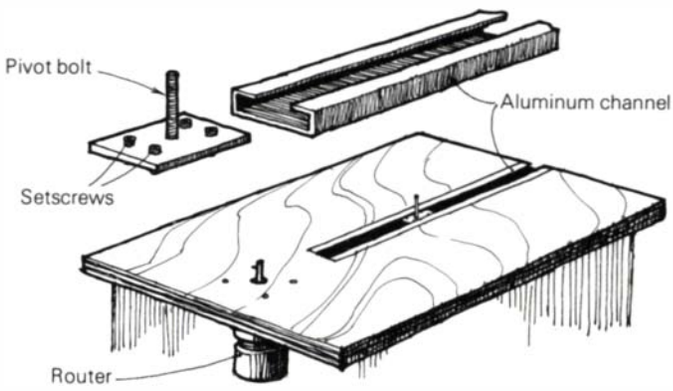
—Arthur L. Fiest, Emmaus, Pa.

Hole-cutter for speaker enclosures

I have been involved in making professional sound equipment and speaker enclosures for a number of years. The usual construction routine requires me to cut holes up to 18 in. in diameter for speaker baffles. Here's how I use a modified router table to cut the holes accurately, quickly and safely.

My router table is constructed of ⅝-in. Baltic birch plywood. I've installed an aluminum-channel track and pivot assembly on the centerline of the table as shown in the sketch. The standard 1½-HP Makita router bolted underneath the table is equipped with a stagger-tooth cut-out bit (Wisconsin Knife Works #68802).

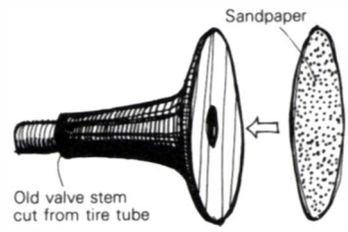
To cut a circle on the setup I first slide the pivot assembly to the right position for the radius I want. Then I lock the assembly in place by tightening the four setscrews. Next I drill a center-hole in the baffle board and slide this over the pivot assembly's threaded rod. I secure the baffle board with a flat washer and a self-locking nut. The baffle board should rotate on the pivot with a mild resistance. Next I turn on the router, bring it up through the wood and rotate the baffle clockwise on its pivot point to cut a perfect circle. Once the device is set, you can quickly reproduce duplicate baffles.



—James Campbell, Orange, Calif.

Ersatz sanding disc

A tire valve stem makes a cheap, simple and flexible mounting for sandpaper. Cut the stem from the tube, glue on sandpaper and chuck the stem in a drill press or portable drill. I use the discs to sand irregular bowls.



—Bart Brush, Cherry Valley, N.Y.

Spreading glue

In assembling doweled joints it is difficult to gauge the right amount of glue for the sockets. If you put in too much, the trapped glue acts as a hydraulic fluid, preventing the joint from pulling up. This simple tool solves the problem by assuring each socket has just the right amount of glue.

Select a short length of dowel the same size as the pins you're using and, with the dowel chucked in a drill, sand slightly undersize. Then saw a narrow kerf through the axis

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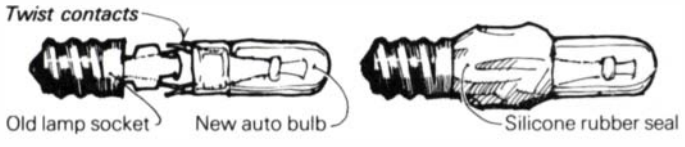
slightly longer than the hole is deep. To use, apply glue to the sockets, then insert the kerfed dowel in each and twist. The tool squeezes excess glue out of the hole and evenly coats the socket. *—Duane C. Marks, Waltham, Mass.*

I offer the following two tips for spreading glue in holes for dowels and on flat surfaces, as in edge-gluing. For dowel holes, take a pipe cleaner and fold it in half. Put glue into the hole and work it on the sides with the pipe cleaner. Use the pipe cleaner to put glue on the dowels. For edge gluing, apply a bead of glue from the container and use a toothbrush to brush an even layer of glue on and into the surfaces to be joined. Do not forget to wash out the toothbrush before you brush your teeth; discard the pipe cleaner.
—Arthur Witt, Jr., Columbia Mo.

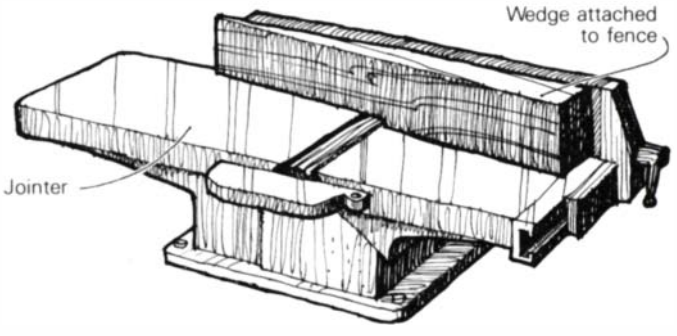
Replacement router light

I own an older Stanley router with a built-in light. When I experienced difficulty finding the 18-volt replacement bulb, I fabricated a replacement using the base of the old bulb and a new automotive bulb. The rugged replacement is still burning strong after four years. To make the bulb, remove the glass envelope from the old, burned-out bulb, saving only the socket with its two filament wires. Twist these to the contact wires on an automotive bulb (type 194 or equivalent). To support the structure and isolate the bulb from vibration, I dabbed silicone rubber (the kind sold for bathtub seal) at the base of the bulb. *—Salvatore Pontecorvo, Ft. Wayne, Ind.*



Skewed jointing

When you're jointing wavy-grained, contrary woods like curly maple, a skewed cutting angle will often produce smoother results with less tear-out than a straight-on cutting angle. To take advantage of this effect simply attach a long wedge to the jointer fence. *—M. W. Uresti, Bryan, Texas*

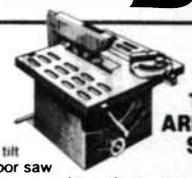


Producing round tabletops on the lathe

Here's how I use my lathe and a sanding disc to produce a perfectly round tabletop. First locate the center of the tabletop blank and cut it roughly to shape. Now cut a short length

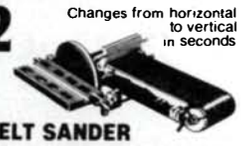
AMERICA'S 7 BEST POWER TOOL BUYS

1 8" TILT ARBOR SAW



8" tilt arbor saw crosscuts, rips, mitres, cuts compound angles, dadoes, coves, moldings. Less blade, motor. Rip fence for easy alignment $6.50 add'l. Ball bearing model $12.50 add'l. Takes 1/3 h.p. motor or larger, standard blades, attachments 22 lbs. f.o.b. factory. **$52.50**

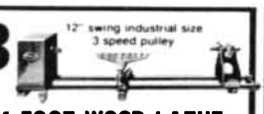
2 Changes from horizontal to vertical in seconds



BELT SANDER

Precision heavy duty sander includes a 4" x 36" sanding belt. Uses 1/3 h.p. or larger motor. V-pulley drive and multi-purpose drive spindle. Disc sander accessory, $17.00 add'l. Mitre gauge, $3.50 add'l. 18 lbs. f.o.b. factory **$52.00**

3 12" swing industrial size 3 speed pulley



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4

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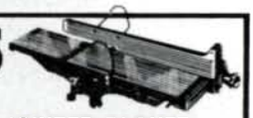
HIGH SPEED TURNING CHISELS { Set of 3, $11.00 / Set of 8, $29.00

5



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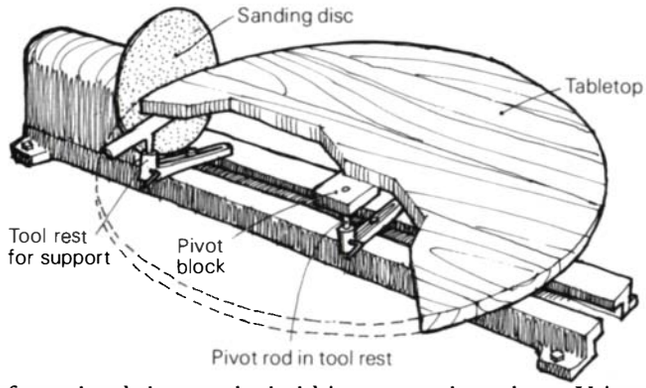


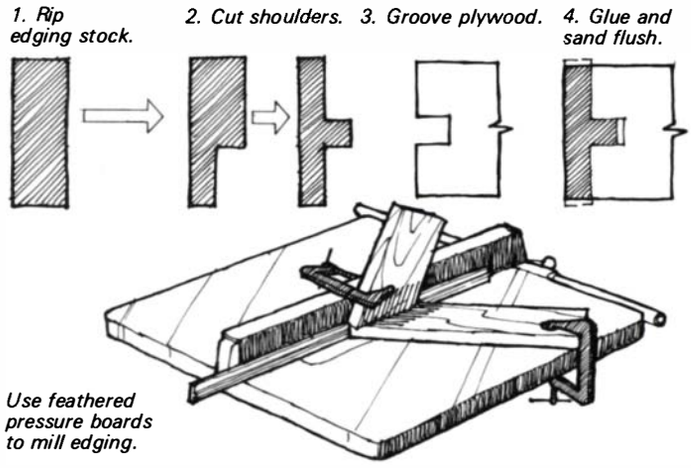
of metal rod that can be held in your tool-rest base. Using a bit the same size as the rod, drill part way through a piece of 2-in. scrap. Screw or clamp the scrap block to the underside of the tabletop at its center. Now mount the work on the lathe's tool rest with the block and the rod acting as a pivot. To level and support the work near the sanding disc, mount another tool rest parallel to and about 1 in. from the disc.

Now turn on the lathe and rotate the tabletop against the disc. If the pivot turns out off-center, loosen the tool rest. Advance the work and finish the entire circumference to the shortest radius. *—Robert S. Maxwell, Washington, D.C.*

Plywood edge-banding joint

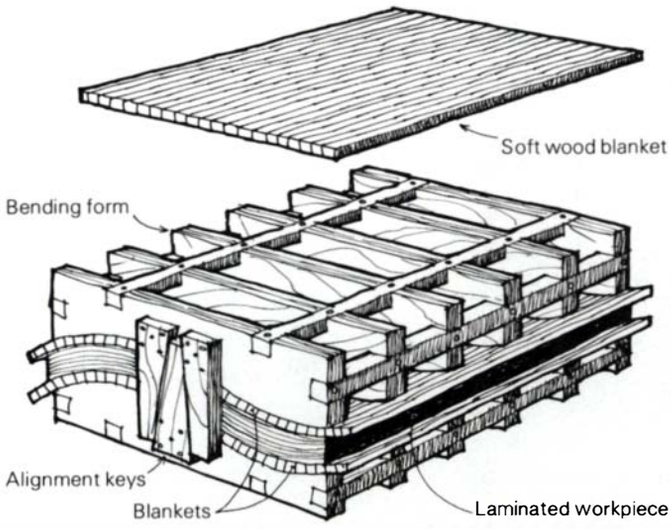
This method for edging plywood is simple yet produces a very strong joint. The idea is to key the edge banding to the plywood via a simple tongue-and-groove joint, so there is no movement when you clamp up.

First rout a groove in the edge of the plywood using a ⅛-in. slotting cutter bit. Take care to center this groove. To make the edging, rip solid stock into thin boards, ¼ in. thick and 13/16 in. wide. Using finger boards on the table saw as shown in the sketch, cut a shoulder on each side of the edging to produce a tongue that fits snugly in the plywood slot. It will take you a couple of tries to get the blade set at just the right height, but once it's set you can mill a hundred feet of edging very quickly. To complete, spread glue on the edging and clamp up. Later sand down the slightly thicker lip of the banding flush with the plywood. *—V. Spiegelman, Los Angeles, Calif.*



Wooden blanket for ribbed bending form

This flexible wooden blanket puts to bed the problem of form squeeze-marks on curved laminated panels. Used in



pairs (one above, one below) the blankets evenly distribute the pressure between the ribs of the form and smooth out small irregularities.

To make the blankets saw ½-in. sq. strips of a soft wood (I used basswood) and string them together with wire. Cut enough strips so the blankets are a couple of inches wider and longer than the workpiece. Drill the wire holes through the strips on a drill press using a fence and stops to ensure the holes are lined up. Drill the holes a little oversize. This makes stringing easy and allows the strips to move freely as they adjust under pressure to the contours of the bend.

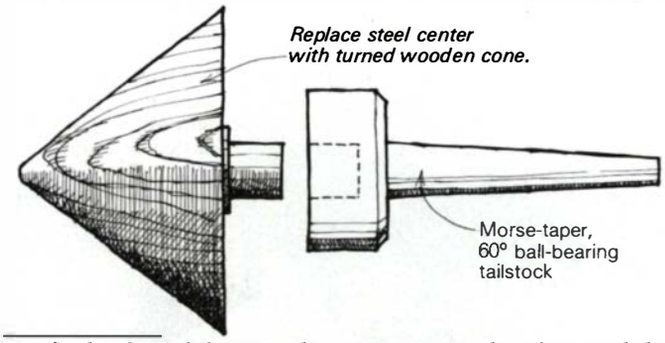
In use I place a piece of ⅛-in. plywood or cardboard between the blanket and the laminated panel to further smooth out the pressure. Form alignment is critical to an accurate curve, so I use indexing fingers (two on the top mated with one on the bottom) as shown in the sketch.

—Robert Thomason, Providence, R.I.

Bull-nose tailstock

I frequently turn pieces that I have drilled out or turned hollow. To support these pieces for further turning and finishing, I use this large-diameter bull-nose tailstock. To make it, remove the metal center from a 60° ball-bearing center and replace it with a larger, turned hardwood cone. Turn a tenon on the base of the cone to fit the ball-bearing center, as shown in the sketch. I have several hardwood inserts of various sizes to fit different projects. All fit the same, single-ball-bearing center.

—Ted Ringman, Barrington, Ill.



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¼"	¼"	1"	2½"	2	$ 8	
¼"	⅜"	¾"	1¾"	3	$ 8	
¼"	½"	¾"	1¾"	4	$ 8	
¼"	⅜"	1"	2"	5	$ 9	
¼"	¾"	¾"	2"	6	$10.50	
½"	⅜"	1"	2¾"	7	$ 8.50	
½"	½"	1¼"	2⅞"	8	$ 9	
½"	¾"	1"	2⅝"	9	$11.50	
¼"	½"	1"	2⅝"	10	$10	FLUSH TRIM BIT WITH B.B.
½"	½"	1"	2⅝"	11	$11	FLUSH TRIM BIT WITH B.B.
¼"	¼" radius	1"	2⅝"	12	$25	ROMAN OGEE WITH B.B.
¼"	⅜" radius	1"	2⅛"	13	$19	ROUND OVER BIT WITH B.B.
¼"	¼" radius	¾"	2½"	14	$17	ROUND OVER BIT WITH B.B.
¼"	½" radius	¾"	2⅛"	15	$21	ROUND OVER BIT WITH B.B.
½"	¾" radius	1"	3"	16	$38	ROUND OVER BIT WITH B.B.
½"	1" radius	1¼"	3¼"	17	$70	ROUND OVER BIT WITH B.B.
½"	½" radius	1"	2¾"	18	$37	ROUND OVER BIT WITH B.B.

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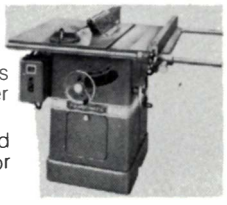

Powermatic

10" Table Saw Model 66 complete with: 48" rails; single phase 2hp (115/230 volt) motor; push button switch. **Sale $1460**

Table Saw Accessories Biesemeyer T-square fence system with 72" rails & 32" extension table **$250.** 3 hp Motor & Controls 1 or 3 ∅ add **$170**

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73 MD	10"	60	⅝"	Cut Off	$76 /$50
84 MD	10"	50	⅝"	Rip/Cross	$72 /$50
71 MA	10"	18	⅝"	Rip	$61 /$41
72 MF	12"	48	⅝-1"	All Purp	$82 /$61
76 MB	12"	48	⅝-1"	All Purp	$99 /$75
Futura 2000			¾/1¼"	Doors	$599/$480
Perfecta		3	¾"	Molding	$220/$185
Wood Working Box		3	¾"	Doors & Molding	$379/$305
Cassette 65 Plus		3	¾"	Molding	$428/$365
72 MD	9"	36	⅝"	All Purp	$62 /$42
74 ME	10"	80	⅝"	Thin Kerf	$96 /$64
84 MC	10"	40	⅝"	Rip/Cross	$68 /$45
DADO 3	8"	18	⅝"	¼-13/16	$162/$122

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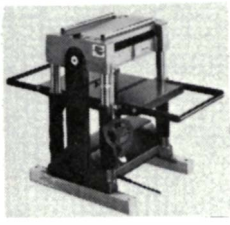

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15⅝" Planer 2040 2hp 115 volt 6500 rpm motor; full cutting range: ¼" thru 7⅝"; 2 quick set knives; speed reducing kit; delivered assembled. **Sale $1250**

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16" Band Saw 2116; 2 hp., (115/230 volt), 1 or 3 phase high torque 1150 rpm motor, 2" wide blade. Can accept down to ⅛" blades. List $1880. **Sale New $1399/Used $1050**

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Jig saw JHV-60 variable speed 0-3,200, stroke 1", 3.5 amp, 115 volt, capacity: wood 2⅜", steel ¼", roller bearing guide, universal split-shaft blade holder, 4 blades, center guide, circle guide, weight 5.2 lbs. **Sale $162 ppd.**

Miter Saw TSB-15" for cutting wood, plastic, aluminum. 45°-90-45° safety lock switch, dust bag, capacity 4¾" high x 6⅜" wide at 90°, 4¾" x 4¾" wide at 45°, ac/dc switch, 13 amp motor, 1" arbor, easy set angle stop, weight 55 lbs. **Sale $450 ppd.**

Miter Saw TSB-10" for cutting wood, plastic, aluminum, 45°-90°-45°, safety lock switch, dust bag, capacity 3⅛" high x 4 15/16" wide at 90°, 3⅛" high x 3⅛" at 45°, ac/dc switch, 13 amp motor, ⅝" arbor, easy set angle stop, weight 44 lbs. **Sale $305 ppd.**

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Q & A

What is the recommended procedure for sharpening a hollow-ground planer blade for a circular saw? Everything I've read indicates it should be sharpened like a combination blade with alternate face angles, no set and the raker teeth ground 1/64 in. below the cutting teeth. Planer blades sharpened by professionals, however, don't seem to have tooth faces ground at an angle. Which is the best way?

—L.W. Ledgerwood, Jr., Houston, Tex.

SIMON WATTS REPLIES: The first step in sharpening a planer blade in the home shop is to dress all the teeth to a uniform circle, known as o.d.-ing in the sharpening trade. The simplest way is to install the blade on the saw arbor and place a coarse stone over the table insert. With the saw running, raise the blade slowly until it just touches the stone and continue until all the teeth acquire a very slight flat. Now remove the blade and file the tops of the teeth to the manufacturer's existing bevel. Unless you have removed a lot of metal in the dressing, there should be no need to file the fronts of the teeth. If you must file the fronts, maintain the manufacturer's original profile, be it flat or angled. Which is best? Prevailing opinion seems to be that filing at an angle produces a keener blade but one that dulls more quickly—the choice is yours.

Once you've decided on the tooth angle, be sure to file the rakers flat so they are about 1/64 in. below the cutting teeth. Two strokes with a file should do it. You are correct about the set; none is required.

I get numerous questions about a method for removing white rings caused by water on furniture finishes. I have listened to many "heard from" methods that I am hesitant to try or pass on. Any suggestions? —Arthur B. Sayer, Morrison, Colo.

DON NEWELL REPLIES: Water rings on finished surfaces can be removed using gentle abrasives. A common method is to dab a paper towel into cigarette ashes and gently rub or scrub the white areas. It may take several rubbings and frequent renewal of the ashes to eliminate the rings. You could also use rottenstone in place of the ashes. It's available at most hardware stores and is about as gentle an abrasive as can be found. [Don Newell, of Farmington, Mich., is a paint and varnish chemist, and author of an industrial finishing textbook.]

I have access to some redwood that has a beautiful purplish hue to it. A local mill informs me that the logs were pilings and were underwater for many years. Can you tell me anything about the effects of immersion on the wood's cell structure? Once milled, the lumber seems to dry overnight with no shrinkage. Also, how can I finish the wood without obliterating the purplish hue? I really haven't experimented much, but natural Minwax and oil tend to darken and overpower the unique color of the wood. —John Stoughton, Fortuna, Calif.

R. BRUCE HOADLEY REPLIES: It is difficult to make an accurate conjecture about the effects of constant moisture on the wood's cell structure. In the tree, redwood heartwood remains unaffected by thousands of years of constant moisture. After harvest, changes in the cell structure depend on variables such as the degree of surface exposure and the presence of sea-water materials which can infiltrate the wood. Over long periods of time, hydrolysis of the cell wall structure may occur. This breakdown, however, usually shows itself as greater than normal shrinkage.

As for finishing, virtually any material will give the same darkening effect as wetting the surface produces. Among fin-

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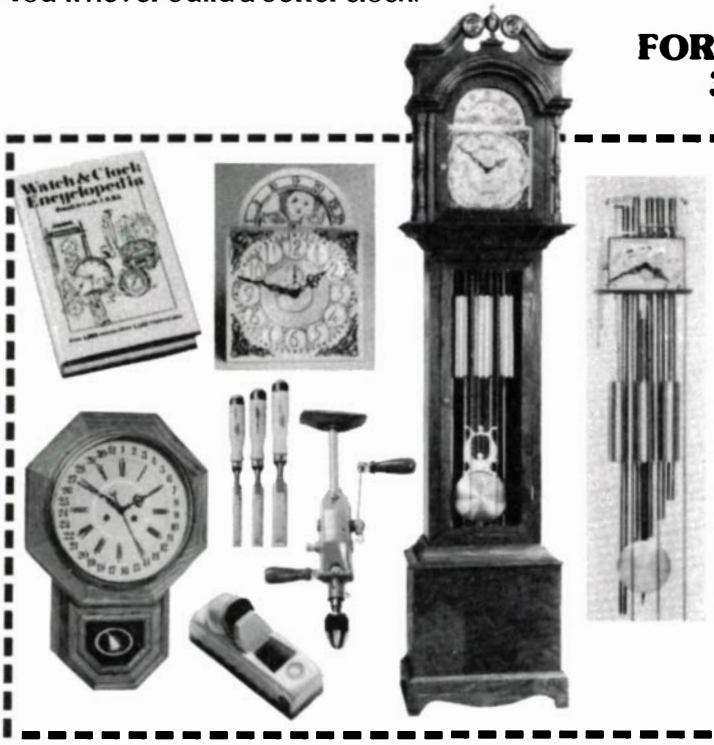

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ishes that give the least color change are clear waxes such as Butcher's or bowling alley wax. Three or four thin coats should give a visible finish with minimal color change. However, I've never used the finish on redwood and I don't know if a whitish cast might develop and mar the final effect. If any readers have tried it, I'd welcome information on their experience.

If liquid resistance is needed, a thin application of marine spar varnish rubbed to the desired gloss level would provide protection with little color change. Since ultraviolet light would probably cause the biggest color change, a varnish with UV inhibitor might be a wise choice.

I have a bundle of about 50 matched elm burl veneer sheets. They are really splendid but have some small defects in the way of small missing knots. What method is best to repair these defects? Should it be done before or after the veneer is glued to the core? When I use the veneer, should a backing be glued to the burls in the same direction as the burl grain or cross grain to it? What kind of glue is best to attach the veneer to the core? —*Michael Chevanelle, Quebec, Canada*

SIMON WATTS REPLIES: Defects in the veneer should be repaired before gluing the veneer to the core. If the holes are almost round, drill them out with a sharp Powerbore or Forstner-type bit with a firm backing to minimize tearing. Cut circular plugs of veneer with a plug cutter to repair the holes. If the defects are irregular, cut diamond-shaped patches. The longer and thinner the diamond is made, the less conspicuous the joints will be.

Once the repairs are completed you can move on to attaching the burl to the core. You should use a cross-band or base veneer, and its grain should always run at right angles to the face veneer. A paper underlayment can be used instead of veneer—one type, known as Yorkite, is available from N.V.F. Co., Box 38, Yorklyn, Del. 19736. If you plan to use a plywood core, lay the base veneer at right angles to the grain of the plywood face plies. If particleboard is your core, grain direction doesn't matter.

I think you would do best to tape the whole veneer surface together before gluing it to the core. If you use underlayment, glue it to the core first and follow it with the burl veneers. Plastic resin glues are often used for veneering, but an adhesive designed for veneering is URAC 185. It's made by American Cyanamid, Wayne, N.J. 07470. This is a gap-filling, low-shrinkage glue.

Our cabin recently burned down and, fortunately, we were able to rescue some of our furniture. However, the smoke and heat damage was extensive, and although alcohol easily removed the soot from our furniture, the wood underneath remained discolored. The pieces we are most concerned about were finished with Danish oil and the woods involved are maple, apple, mahogany and sycamore. Could you advise on the restoration of this furniture?

—*Peg Klouda, Anaconda, Mont.*

DON NEWELL REPLIES: Simple surface staining of the woods by smoke and heat is one thing but actual color changes due to finish degradation is something entirely different. In any case, I'd start with another cleanup using fine to medium steel wool wetted with mineral spirits. Dip the pad frequently in fresh solvent to rinse out what you have removed from the surface. Mineral spirits is a mild solvent that shouldn't affect what remains of the old finish. Its purpose is to act as a lubricant and

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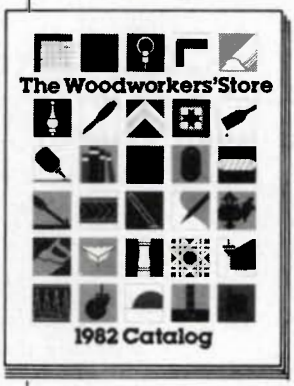

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GEORGE FRANK REPLIES: Your real problem may not be removing surface discoloration but dealing with the wood itself being charred or scorched. If such is the case, there is no trick, magic or chemical that can bring the wood back to its original state. All charred particles must be scraped or sandpapered away, and only when a fresh surface appears can you begin your new finishing job.

JIM CUMMINS REPLIES: I've had luck removing the smoke glaze from fire-damaged picture frames only by using ammonia. If all else fails, try non-sudsing ammonia on some hidden spot. Even if it seems to work, resist doing the whole job for a few days. Wait to see how the cleaned wood accepts refinishing. [Jim Cummins, copy editor of *Fine Woodworking*, has restored and framed pictures for 15 years in Woodstock, N.Y.]

I have subscribed to your magazine from the beginning and never recall having seen a discussion on how to achieve the strongest edge-to-edge joint in wood. I am building a 29-ft. auxiliary sloop and plan to make the cabin sides by joining two planks edge to edge. The width of the joined plank will be 20 in. and the thickness ⅞ in. Is the strength of the joint enhanced by adding dowels or splines?

—Bruce M. Lane, Bedford, Mass.

R. BRUCE HOADLEY REPLIES: I strongly believe that properly executed side-grain to side-grain gluing can devleop joint strength equal to that of the weaker piece. This leads me to conclude that if joints are failing or are expected to fail, the approach should be to check out the gluing procedure step by step. Adding splines or dowels is not a substitute for good gluing procedures. If the gluelines are well made, little is gained in trying to reinforce the joint, since the strength of the wood on each side of the glueline remains the limiting factor.

Dowels and splines in edge joints are more useful in ensuring board surface alignment than they are in augmenting strength. In fact, a longitudinal spline in an edge joint may end up weakening rather than strengthening the final result. A ¼-in. spline along the length of a ¾-in. joint, for example, would reduce the joint surface area by one-third and would result in a corresponding loss of strength. In the case of dowels, pins of relatively small diameter and about 1 in. long are all that is needed to do the alignment job. They should fit snugly into accurately positioned holes and no attempt need be made to glue them.

While in a forest we found lots of small red oak 5½ to 7 in. in diameter still standing, but dead with the bark peeling off and what looks like worm marks between the bark and the tree, as if something had eaten away the cambium layer. What type of disease do these young oaks have and is there any cure? When trees die this way, how is the wood affected as far as drying is concerned?

—Terry Trudell, Saginaw, Mich.

R. BRUCE HOADLEY REPLIES: Sight unseen, it would be difficult to guess at the cause of death in oaks, as many different diseases, insects or environmental conditions might be involved. I suggest you contact the extension forester at your state university, or the State Department of Parks and Forests.

In disease-killed trees, if the wood is still unstained or otherwise unaffected by insects or fungi, it can usually be processed and dried similar to normal wood. However, due regard to appropriate disposal of residue should be given in the case of certain communicable diseases or where insects have reached epi-

demic levels. In the case of Dutch-elm-disease-killed trees, for example, the bark should be destroyed by burning or burying to eliminate the habitat for the species of bark beetle which spread the disease.

I've recently completed a sculpture in butternut and I am troubled by a dark grain blemish which is visually disturbing. Is it possible to apply a chemical or preparation to the distracting area to blend it with the adjacent area? What method should be used to avoid a reverse problem? I have had no experience bleaching woods and therefore have no idea of what to expect. —*Paul S. Twichell, Keene Valley, N.Y.*

GEORGE FRANK REPLIES: The arsenal of bleaches we woodfinishers use is rather poor. The most important are chlorine and oxalic acid. The only way to find out how to eliminate the disturbing color in your sculpture is to experiment. Start with the oxalic acid. It is available from paint stores in crystal form and must be dissolved in alcohol. Apply the solution with a brush and allow the alcohol solvent to evaporate. You may wish to alternate the acid treatment with ordinary household bleach applied in a similar manner. When using these chemicals, beware: use a chemical filtering mask and ventilate the area well.

If these chemicals provide no relief, you may try peroxide bleach. The peroxide may do a better job than the others but it may also completely kill the markings of the wood. Whichever solution is used, a thorough washing with a fairly strong laundry detergent, used warm, may increase the effectiveness of your bleaches.

Finally, if all else fails, you may have to camouflage the problem area under a veil of pigmented finish—in plain woods, paint the desired color over the unwanted one. This requires a certain amount of skill and, surprisingly, the need for such skill frequently uncovers its existence.

At a recent garage sale, I purchased several old tools including two planes marked Stanley #605 and #608. After cleaning the #608, a 24-in. jointer with a corrugated sole, I noticed the inscription "PATD APR 2 '95" on the body and "STANLEY R&L CO." on the frog. What does the "R&L" stand for? Also, has anyone published a list and description of all the models of planes produced by Stanley? —*Bart Wesley, Denison, Tex.*

The R&L stands for Stanley Rule and Level Co. There are several lists of the old Stanley planes, a number of reprints of old Stanley catalogs and a few organizations of collectors of old tools. You should start by getting in touch with the Early American Industries Association, Old Economy, Ambridge, Pa. 15003. This is the national organization of collectors and users of old tools, with lots of local chapters, a quarterly journal and a newsletter. Then there is the British-American Rhykenological Society, 60 Harvest Lane, Levittown, N.Y. 11756. Rhykenology is the study of planes. Finally, for $5, Roger K. Smith at 1444 N. Main St., Lancaster, Mass. 01523 sells reprints of Stanley's illustrated 1909 catalog.

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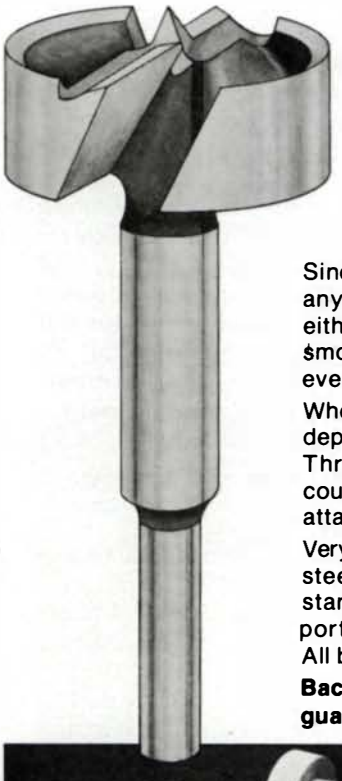

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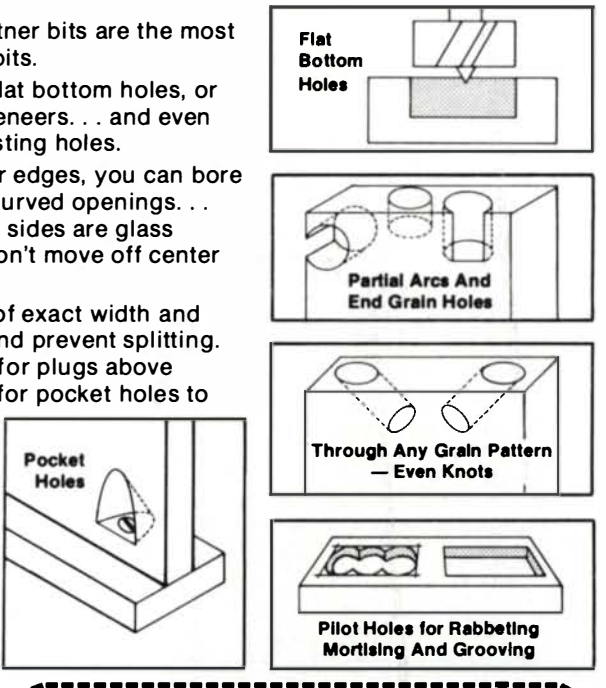

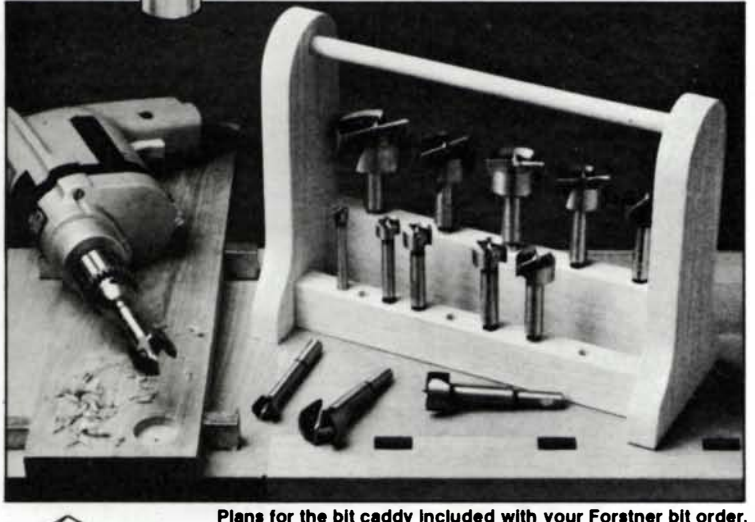

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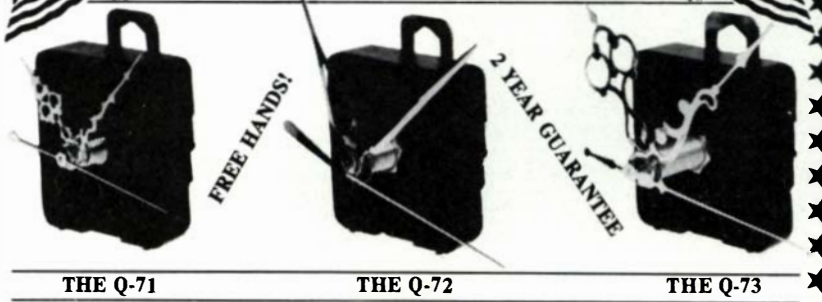

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Books

Furniture of the American Arts and Crafts Movement by David M. Cathers, with photographs by Peter Curran. *New American Library, 1633 Broadway, New York, N.Y. 10019, 1981. $19.95 hardcover; 275 pp., 200 photographs.*

Ten years ago you couldn't give it away. Nowadays a single piece of mission oak furniture, if it's the right stuff, will fetch thousands of dollars at a Sotheby auction (the record is $21,000 for a rare settee). Riding this wave of interest comes David Cathers' book, *Furniture of the American Arts and Crafts Movement.* Cathers' effort is essentially a picture book that will likely become a bible for collectors.

But for woodworkers, this book can play another role. If you prefer straightforward, soundly joined, solid-wood furniture, you'll instantly relate to these "modern" 70-year-old designs. The Arts and Crafts Movement was imported from England to the U.S. by Gustav Stickley *(FWW* #2, Spring'76), who championed and promoted its ideas and designs in the pages of an influential magazine, *The Craftsman.* The movement rejected the shoddy, over-decorated, machine-made goods of the Victorian era and sought to substitute for them simpler, unadorned, handmade articles. For a few years, from 1900 to about 1915, the Arts and Crafts Movement influenced all areas of craft, design and architecture; the ubiquitous bungalow house is perhaps our most common reminder of the movement. After World War I, America's tastes drifted to other interests leaving the Arts and Crafts Movement behind and leaving Stickley bankrupt.

The book contains a brief, informative history of Stickley and his competitors. The rest of the text is devoted to the stylistic development of Stickley's furniture. One chapter tells how to date Stickley furniture using brand labels, hardware, construction details and the like. There are 200 or so large, clear pictures of chairs, bookcases, tables, desks, sideboards and other items.

Each photo of a piece of furniture carries an accompanying description. Some of the most interesting tidbits are tucked away here and there in these descriptions. However, photos are grouped together in one place and descriptions in another. You have to flip pages back and forth. Woodworkers will also be frustrated by the lack of construction and joint details.

These objections aside, the book represents a major addition to the growing library of books dedicated to the Arts and Crafts Movement. *—Jim Richey*

The Simple Life by Fiona MacCarthy. *University of California Press, 2223 Fulton St., Berkeley, Calif. 94720, 1981. $19.95, hardcover; 192 pp., 24 illus. In England: Lund Humphries Publishers Ltd., 26 Litchfield St., London WC2, £7.95.*

Gimson and the Barnsleys by Mary Comino. *Evans Brothers Ltd., Montague House, Russell Square, London WC1B 5BX, 1980. £13.50, hardcover; 224 pp., 166 illustrations.*

Utopian Craftsman by Lionel Lambourne, *Astragal Books, Architectural Press Ltd., 9 Queen Anne's Gate, London SW1H 9BY, 1980. £12.95, hardcover; 246 pp., 250 illustrations.*

MacCarthy's book, *The Simple Life*, will have a familiar ring for those who first picked up a chisel during the heady days of Woodstock and the *Whole Earth Catalogue* — the same ideal-

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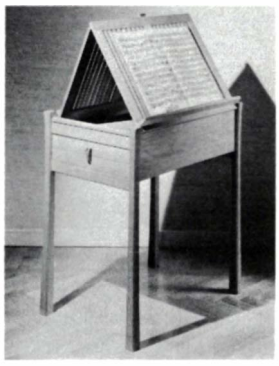

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ism, optimism and endearing dottiness of those days permeates this story of the Guild of Handicraft and its remarkable founder, Charles Robert Ashbee. Established in London in 1888, the Guild was a practical experiment in idealism. Guildsmen determined company policy, schemed for cooperative ownership, and engaged in outside activities as a team.

Ashbee was an ambitious, energetic and optimistic man with a sharp social conscience and a highly emotional conception of platonic male friendship. Like many of his Arts and Crafts contemporaries, he was independently wealthy, as well as a university-educated architect. As the Guild grew and prospered, Ashbee's influence remained prominent. Though Guildsmen were elected, Ashbee recruited most of the candidates. He put great store in a firm handshake, a steady gaze and a capacity for man-to-man camaraderie.

By 1900 the Guild included jewelry, silver, cabinetmaking and carving workshops, a smithy, and a publishing house. Architectural commissions from Ashbee, his wealthy friends and fashionable London clients kept the Guild going. This dependence on the wealthy was an irony not lost on the Guild's egalitarian craftsmen or Ashbee himself.

But it was the life of the craftsman, not the products, that mattered most to Ashbee. He devoted endless hours to Guild activities—cycling and walking tours, weekends in the country—designed to draw the men closer together and make life more enjoyable. In 1902, the Guild moved from London to seek the simple life in the country. There, life would be active and healthy, class distinctions would fade, and bonds between men would be strengthened by wholesome toil and purposeful leisure.

Thus almost 150 men, women and children moved to the picturesque, but listless, Cotswold village of Chipping Campden. This extraordinary transplantation and its effects on the Guild and the town are the focal point of *The Simple Life*.

The strength of MacCarthy's book lies in her sharp delineation of personalities and her evocation of life in Chipping Campden. She has drawn heavily, and happily, from the diaries kept by Ashbee and his wife Janet, both perceptive, witty writers.

Idealism is tested under fire as we observe the efforts of real people trying to live up to it. Five years after moving to Chipping Campden the Guild was bankrupt, victim of the familiar collision of idealism with economics.

A few miles south of Chipping Campden, the furniture workshops of Ernest Gimson and Sidney Barnsley were run more conventionally; Gimson had employees, and Barnsley worked alone. Though Gimson and Barnsley shared many of Ashbee's beliefs, their personal shyness made any dreams of their own craft community impossible.

Comino's book is the first comprehensive study of Gimson and the Barnsleys' lives and works. With so much ground to cover, it lacks the intensity of *The Simple Life* and the depth that an analysis of just their furniture might have had. It is also unfortunate that the photographs lack contrast. Nevertheless, this is an essential book for furniture makers with a serious interest in the history of their craft.

The same cannot be said of *Utopian Craftsmen*. This survey of the Arts and Crafts Movement adds little to what is already in print, such as Fiona MacCarthy's *All Things Bright and Beautiful*, Anscombe and Gere's *Arts and Crafts*, or Gillian Naylor's *The Arts and Crafts Movement*. Save your money on this one.

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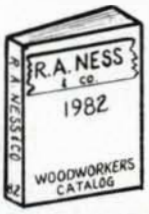

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DASHBOARDS D'ELEGANCE

BY DONALD M. STEINERT

If you'd like to acquire a nice collection of machinery and start your own business, first buy a Rolls-Royce, a quart of varnish and a 2-in. China bristle brush. Here's how it worked for me.

Author at the Pebble Beach Concours d'Elegance with the first Rolls-Royce whose interior woodwork he restored. Photo: Patricia F. Steinert.

In 1955, when I was seven years old, my parents took me to the International Automobile Exposition at the Pan-Pacific Auditorium in Los Angeles. The cars that intrigued me the most were the Rolls-Royces because they looked so old fashioned, and they were so expensive. My father told me that they were the best cars in the world and that they were entirely hand made. But what a shock! The night before, vandals had broken into the auditorium. They'd scratched the paint on the Rolls-Royces right down to the aluminum, and furrowed the beautifully veneered and hand-polished interior wood. I couldn't understand why anybody would do something like that, and I wondered if the damage could be repaired.

That was the beginning of a lifelong interest in Rolls-Royce motorcars. When I became old enough I rented a Rolls-Royce once in a while just for the fun of it. More than once I hired chauffered Rolls-Royces to transport newlywed friends from the church to their reception. People knew of my interest, and I would receive photographs and newspaper clippings about this special make of car.

On January 19, 1975, a friend told me that there was a 1936 Rolls-Royce for sale at a ridiculously low price. I said, "It's probably a wreck." I never intended to buy a Rolls, but I called the owner and arranged to look at it. The next day I was driving my Rolls-Royce, guided by the Flying Lady on the radiator, across the Bay Bridge to my home in San Francisco. My wife, Pat, thought I was out of my mind, but she was having almost as much fun as I was. I am not a man of means. My wife and I are teachers, and we don't have a nest egg to fall back on. Yet here I was: the first kid on my block to own a Rolls.

Soon I became an active member of the Rolls-Royce Owners' Club. They held technical meets on a regular basis to help owners restore and maintain their automobiles. I soon noticed that many cars that were otherwise almost perfect had interior wood in need of attention.

I met a gentleman who was restoring a 1929 Rolls-Royce Phantom I Brewster Ascot Phaeton for its owner in Beverly Hills. He intended to enter it in the Pebble Beach Concours d'Elegance (which is like a beauty pageant for vintage cars) in Carmel, California. The interior wood needed complete restoration. I convinced this gentleman to let me do the job. I'd done quite a bit of repair and restoration of antique furniture, and learned how to do high-quality piano finishes under a very fine cabinetmaker in San Francisco. But this was the most prestigious and challenging job I had ever taken on.

I had no professional finishing equipment at the time, and only a few quality hand tools. To go into business, I bought a 2-in. pure China bristle brush for $7 and a quart of McCloskey's Bar Top varnish. I set up my finishing room in a spare bedroom because the garage was too damp and cold. I brushed on eight coats of varnish, carefully hand-sanding between coats. I put the pieces of wood inside ventilated cardboard boxes to keep them dust-free while they dried. The final coat was wet-sanded with #600 silicon carbide paper and then rubbed out with increasingly finer pumice and rottenstone. The restorer was thrilled. The car went on to win prizes.

Word spread that there was somebody around who could restore Rolls-Royce wood to "as-new" condition. My next job was to restore all the interior wood in a 1951 Rolls-Royce Silver-Wraith H.J. Mulliner limousine, including the division between chauffeur and passenger compartments, vanities, and picnic tables. This car had been outside for many years with its front sunroof partly open. Quite a bit of re-veneering was required. This job was in my shop—now a 2-car garage almost half-filled by my own Rolls-Royce—for one year. It took me nine months just to find veneer that would match the original. In the interim, I was doing work on other Rolls-Royces, and teaching industrial arts full-time.

Then in response to an invitation from the Northern California Region of the Rolls-Royce Owners' Club, I conducted a technical meet on wood refinishing in my junior high school shop and impressed the chairman of the club, who turned out also to be a salesman for a Rolls-Royce distributorship. This came to have tremendous impact on my business.

In the meantime I discovered that buying an old Rolls-Royce was the cheap part; restoring it was another story. As a hobby it was way out of my league. My Rolls needed a new cylinder head, and the part alone would be over a thousand dollars, *if* I could get one. My status symbol was becoming just an old car that was taking up half my shop. With no regret I sold my "proper motorcar" for almost twice what I paid for it, and paid off a second mortgage on my home. With the rest of the money I bought a compressor, a table saw, a jointer, a drill press, a bandsaw, and a shaper—all of industrial quality. I didn't have any place to put them, of course, because the Rolls-Royce work just kept filling up the shop.

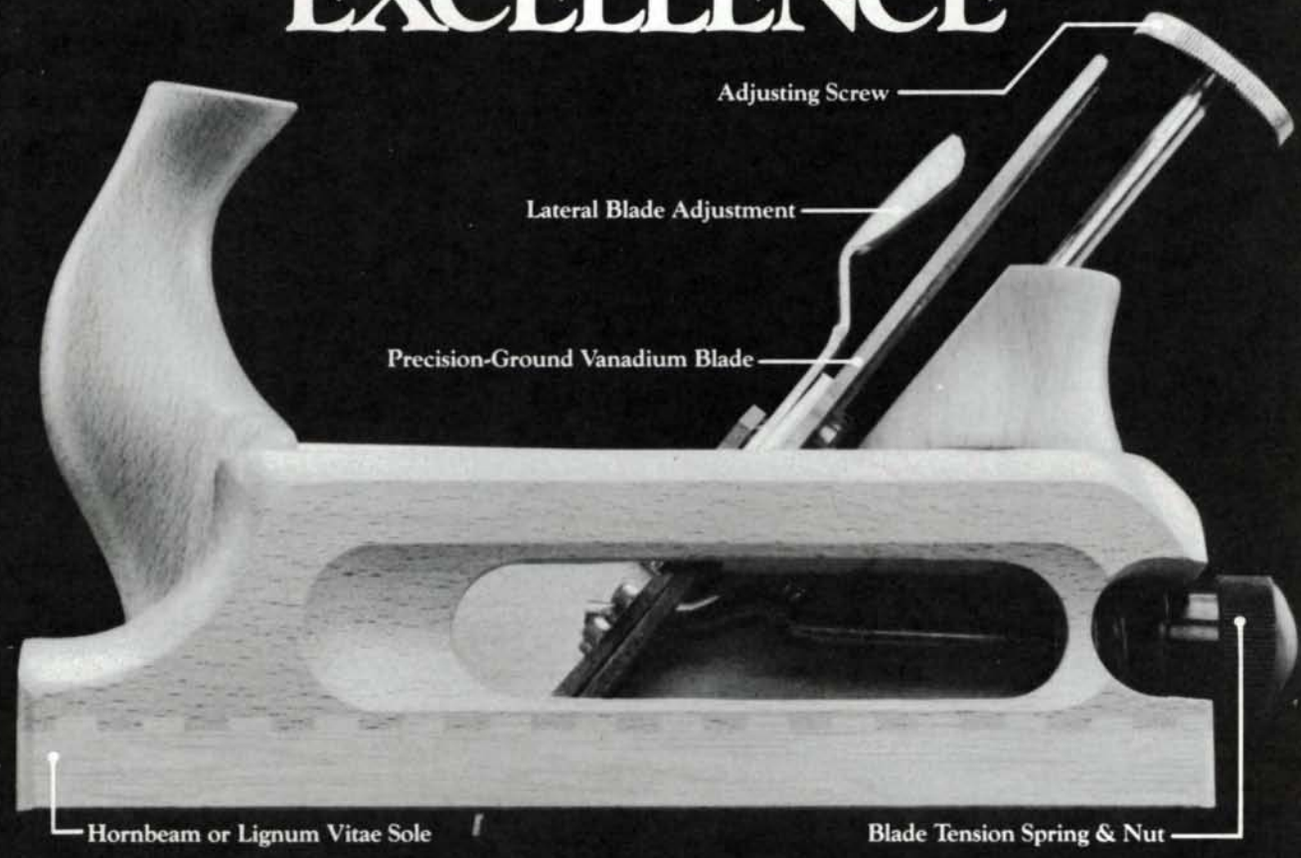
In the summer of 1979, my wife and I moved to southern Oregon and did the finishing work on our new house. I made sure to have a 1,400-sq. ft. basement workshop in the plans. Because we built into the side of a hill, I even have daylight while I work.

I'm about ready to get back to working on cars. If I see a damaged dashboard at a concours, my fingers start to itch. I don't wonder if they can be fixed anymore, I just wonder when they'll find their way to Oregon. □

Fine Woodworking *buys readers' adventures. Suitable length is 1,500 words or less—up to six typed pages, double spaced. Please include negatives with photographs.*

Donald Steinert has left teaching, to work wood full-time in his sunlit basement.

THE STANDARDS OF EXCELLENCE



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Events

Events listings are free but restricted to workshops, fairs, lectures and exhibitions of direct interest to woodworkers. The next deadline is Jan. 1, for events beginning March 1 to May 15.

ARKANSAS: **Juried Art Fair**—May 7-9. Deadline for slide entries Mar. 31. $45 entry fee. Contact Don Kennett, RR. #2, Box 324, Eureka Springs, Ark. 72632.

CALIFORNIA: **Lecture and Demonstration** with Dale Nish at 3 Cutting Edge locations: Jan. 7-8 at 3871 Grand View, LA; Feb. 4-5 at 7626 Miramar Rd., Suite 3500, Santiago; Mar. 4-5 at 1836 4th St., Berkeley. $30. Contact the Cutting Edge at Grand View location.
Workshop with Sam Maloof, $45 March 6; The Cutting Edge, 3871 Grand View, Los Angeles, Calif. 90066.

CONNECTICUT: **Seminars and Workshops**—Crafts history, business and philosophy, Feb. 5-6. Mack Headley: "Colonial Woodworking," April 17-18. Bud Kronenberg: "Canadian Goose Carving," April 24-25. Stephen Hogbin: "Design for Woodworkers," April 24-25. Bruce Hoadley: "Wood Properties and Technology," May 15-16. Write Brookfield Craft Center, P.O. Box 122, Brookfield, Conn. 06804.

FLORIDA: **Design Competition**—multipurpose furniture, May 15 to July 4. Entry deadline, Feb. 1. Fee $10, student; $20, others. Contact Arango, Metropolitan Museum and Art Center, 1212 Anastasia Ave., Coral Gables, Fla. 33134.

INDIANA: **Juried Art Fair**—June 12-13. Deadline for slides and $40 entry fee, March 1. Contact Joan Kisner, 630 N. Washington St., Danville, Ind. 46122.
Workshop—Hardwood Lumber Grading, Feb. 15-19. Contact John R. Seifert, Dept. of Forestry, Purdue University Forestry Center, Branchville, Ind. 47514.

MAINE: **Seminars**—Saturdays in Feb. and March. Contact Woodbutcher Tools, Shelter Institute Bldg. 38 Center St., Bath, Maine 04530.

MARYLAND: **Exhibit**—"Maryland Furniture Planely Dressed," Jan. 1 through Feb. 26. City Hall, 100 Holiday St., Baltimore, Md.
Exhibit and Sale—Sixth Annual Winter Market of American Crafts, open to the trade: Feb. 24-25, open to public: Feb. 26-28. Contact Carol Sedestrom, American Craft Enterprises, Inc., P.O. Box 10, New Paltz, NY 12561.

MASSACHUSETTS: **New England Buyer's Marketplace**, all crafts, May 10-11, Hynes Auditorium, Boston, Mass.
Winter Workshops for Families in various crafts, Saturday afternoons, Jan. through March. Old Sturbridge Village, Mass. Call (617) 347-3362, ext. 323 or 285, for details.
Juried Craft Fair—May 14-16. Entry deadline, Feb. 12. Fee $10, 5 slides. Booth $100. All craft media. Worcester Craft Center Fair, 25 Sagamore Rd., Worcester, Mass. 01605.

MINNESOTA: **Exhibition**—de Stijl, three decades of work from the Dutch design movement, including furniture and architectural maquettes. Feb. through March, Walker Art Center, Minneapolis, Minn.; April 20 - June 27, Hirshorn Museum and Sculpture Garden, Washington, D.C.

NEBRASKA: **Juried Exhibition** of furniture and rugs, Jan. 30 - March 10. Craftsmen's Gallery, 511 S. Eleventh, Omaha, Neb. 68102.

NEW HAMPSHIRE: **Seminars**—Japanese woodworking techniques, Toshio Odate, Jan. 9-10; European woodworking machinery, Robert Major, Jan. 16. Contact Mahogany Masterpieces, RFD 1, Wing Rd., Suncook, N.H. 03275.
Competitions for New England craftsmen, March 22 to April 28; includes wood, clay, metal, glass and fiber. Entry deadline Jan. 11. University Art Galleries, U.N.H., Durham, N.H. 03824.
Workshops—woodturning with Rude Osolnik, design for crafts with William Katavolos, Jan. 17-20. Seminar 82, League of N.H. Craftsmen, 205 N. Main St., Concord, N.H. 03301.

NEW JERSEY: **Lecture**—originals, reproductions and restorations, Robert Whitley, Feb. 10 at South Hunterdon Regional H.S. Contact Ed Ciurczak (201) 788-1405 or 236-2708.

NEW YORK: **Open shop/demonstration** by Maurice Fraser: Joinery, sharpening, hand-planing; evening of Jan. 5, free. Craft Students League of the YWCA, 610 Lexington Ave. (at 53rd St.), New York, N.Y. 10022; (212) 755-2700.
Courses begin Jan. 11, beginning / intermediate/advanced, 15 wks., $157. Craft Students League of the YWCA 610 Lexington Ave., New York, N.Y. 10022.

OHIO: **Workshop**—one week of Windsor chair making with Mike Dunbar at Hiram College, March 14-19 or 21-26. Contact David Factor, Dunbar-Conover Woodworking School, 18125 Madison Rd., Parkman, Ohio 44080.

OKLAHOMA: **Seminar**—Ian Kirby, preparation of stock, sharpening and joinery, Feb. 26-28. Fine Tool and Wood Store, 724 W. Britton Rd., Oklahoma City, Okla. 73114. Contact Cheryl Hays (800) 255-9800 or (405) 842-6828.

SOUTH CAROLINA: **Conference on Antiques**—Americans at Home, 1730-1830, Feb. 3-7. Write Sea Pines at Hilton Head, Hilton Head Island, S.C. 29228. *(continued, p. 48)*

TENNESSEE: **Juried Exhibit**—Tennessee Artist-Craftsmen's Assoc., March. Deadline for slides, Jan. 8. Write University Gallery, Memphis State University, Memphis, Tenn. 38152.

TEXAS: **Juried Crafts & Art Fair**—Mar. 20-28. Contact The Houston Festival, Crafts and Arts Exposition Committee, 6128 Village Parkway, Houston, 77005.
Workshop—Japanese Tools and Joinery, Toshio Odate, Jan. 30-31. Enrollment limited. Contact Myer Frauman, The Wood and Tool Store, Dallas, Texas 75235; (214) 631-5478.

UTAH: **Juried Exhibition**—wood, fiber, clay, glass or metal. Show April 1-30. Deadline for slides Jan. 4. Write Iron Co. School District, Cedar City Art Committee, P.O. Box 879, Cedar City, Utah 84720.

VIRGINIA: **Exhibition**—by Virginia woodworkers. Jan. 10 through Feb. 10 at Lynchburg Fine Arts Center, then from Feb. 14 through Mar. 14 at Staunton Fine Arts Assoc. Contact Lynchburg Fine Arts Center (804) 846-8451.

WEST VIRGINIA: **Juried Exhibition**, June 20-July 31. Open to all West Virginia woodworkers. $10 entry fee. Deadline Feb. 15. Contact John Ellis, Stifel Fine Arts Center, 1330 National Road, Wheeling, W.Va. 26003.
Seminar with Doug Sigler and John Ebels, Feb. 27-28. Workshop with Tage Frid Mar. 1-5. Write Crafts Center, Cedar Lakes Conference Center, Ripley, W. Va. 25271.

NOVA SCOTIA: **Courses**—Joinery techniques, Deryk Jones, begins Feb. 3, $35; plane and clamp making, Richard Tyner, begins Mar. 24, $45; lathe instruction, Deryk Jones; furniture making, Deryk Jones, Fall '82. Contact Richard Tyner, 32 Edmonds Grounds, Halifax, N.S. B3N 1M6.

Bill Fitz-Patrick, The White House

Ronald Reagan tries out his new rocker while maker Sam Maloof, of Alta Loma, Calif., stands by. The chair brought $8,000 last October at a benefit auction for the American Craft Museum in New York, celebrating its silver anniversary. The anonymous purchasers promptly donated the rocker to the White House—the first piece of contemporary craft furniture in its collection. Maloof calls this "encouraging, a sign that craft in general is beginning to get recognition."

Connections

In CONNECTIONS, *we'll publish membership calls for guild-style organizations, letters from authors compiling directories in which craftsmen might like to be listed, and appeals from readers with special interests looking for others who share them.*

Wheelwrights: I am trying to find people making wheels for old buggies and the like, as well as publications and organizations focusing on them. Write Lance Wright, 1130 NW Kingston, Bend, Ore. 97701.

Palouse Woodworkers Guild is forming. Contact Michael Hutton, 132 Stymer Ave., Moscow, Idaho 83843; (208) 882-9549.

Residents of South Holland, Flanders and the Rhineland area of Germany: I am interested in finding local sources of hardwoods or in forming a cooperative to arrange group purchases from the U.K. Write R. Emmerson, Torenberglaan 8, 5628 EN Eindhoven, The Netherlands.

Eleven Scholarships (one each in 11 intensive summer workshops) available at Kirby Studios to professional woodworkers. Send up to five slides or photos, and no more than two pages of written material by April 1. For list of workshops, write Kirby Studios, North Bennington, Vt., 05257.

Toy Makers Sought. Folksay Press is publishing a book: Contemporary Toys and Their Makers, and seeks toys for this book. All types except soft toys and dolls. Write: Folksay Press, 67131 Mills Road, St. Clairsville, Ohio 43950.

Northeast Craft Fair at Rhinebeck June 22-27. Deadline Jan. 8. Simultaneous jurying for new Newport, R.I. Craft Fair, July 23-25, retail only. Applicants can show in either, not both. Call (914) 255-0039, or write American Craft Enterprises, Inc., P.O. Box 10, New Paltz, N.Y. 12561.

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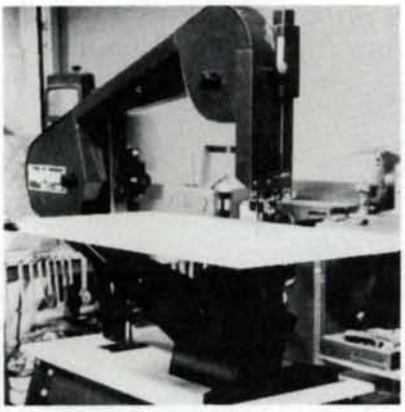

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The Turned Bowl

The end of infancy for a craft reborn

by John Kelsey

For more than 3,000 years, sturdy bowls and plates of turned wood were among the most ordinary kitchen utensils. But during the past 100 years, the useful wooden bowl has been supplanted by mass-produced ware of ceramic, glass, metal and plastic.

Forty years ago, James Prestini added a dimension to traditional woodturning: the delicate, decorative wooden bowl. During the past ten years this new craft of the turned bowl has blossomed and matured.

This contemporary flowering became publicly apparent last September in Philadelphia, when the Turned Objects Exhibition opened in conjunction with the Tenth Woodturning Symposium. The exhibition consists of 100 contemporary wooden turnings, selected by three jurors from about 1,500 entries. It will be traveling around the country during the next few years, provided sponsors can be found (box, p. 61). The symposium was a long weekend of technical demonstration and aesthetic argument among 30 expert turners, with 150 other turners, both amateur and professional, looking on and joining in. At the same time it was the summation of a five-year adventure, and the end of infancy for this craft reborn.

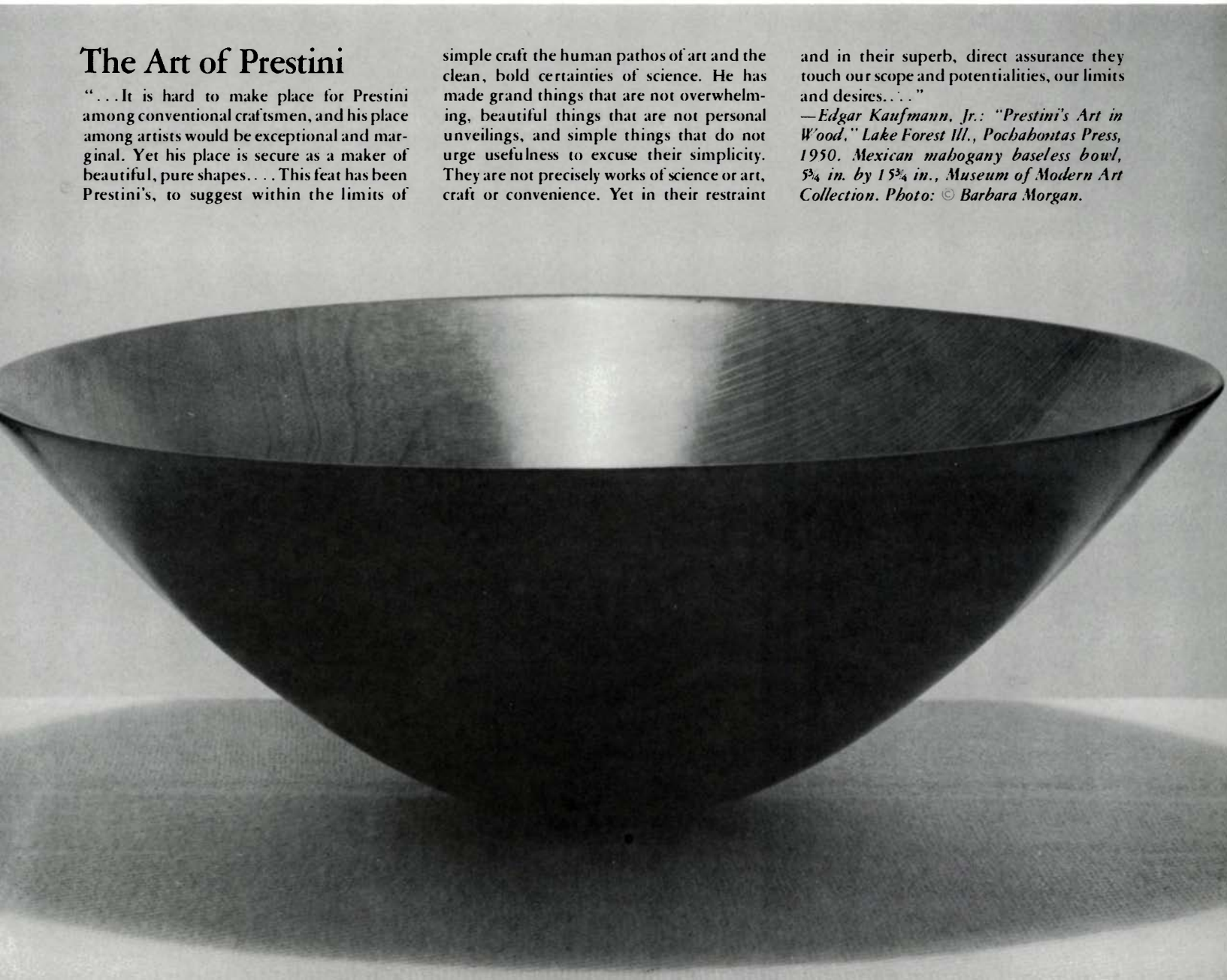
Along with a whole crowd of woodturners, I spent a day of that September symposium in a gallery filled by those 100 turned objects. Many of the 60 makers represented were there, as was juror David Ellsworth and symposium organizer Albert LeCoff.

We'd gathered to talk about this craft and its evolution, and to argue a little too. We tried to get beyond mutual admiration (hey, what a beautiful piece of wood) and on to what else might be said, not about turning tools and techniques but about design and aesthetics. Many of the turners in the room were having the first chance of their craft lives to

The Art of Prestini

"...It is hard to make place for Prestini among conventional craftsmen, and his place among artists would be exceptional and marginal. Yet his place is secure as a maker of beautiful, pure shapes.... This feat has been Prestini's, to suggest within the limits of simple craft the human pathos of art and the clean, bold certainties of science. He has made grand things that are not overwhelming, beautiful things that are not personal unveilings, and simple things that do not urge usefulness to excuse their simplicity. They are not precisely works of science or art, craft or convenience. Yet in their restraint and in their superb, direct assurance they touch our scope and potentialities, our limits and desires..."

—Edgar Kaufmann, Jr.: "Prestini's Art in Wood," Lake Forest Ill., Pochahontas Press, 1950. Mexican mahogany baseless bowl, 5¾ in. by 15¾ in., Museum of Modern Art Collection. Photo: © Barbara Morgan.



discuss their work with their peers, to hear artisans whose work they'd admired talk about ideas and values. I've been guided by that day of talk in choosing the turnings from the show to include in the second half of this article. But first, some highlights from 3,000 years of woodturning history.

The oldest turnings—The first archaeological fragments that seem to have been turned from wood are about 2,600 years old. They've been dug up in northern Italy and in Asia Minor. Archaeologists know a lot more about pottery than about turned wood, because potsherds don't decay the way woodchips do. The earliest turned wooden object to have survived intact is a bowl from a burial mound in Bavaria, about 600 B.C. As the sketch at right shows, the turner left toolmarks in a decorative ridged pattern and turned a ring free of the bowl's stem. Such sophistication indicates the lathe was already well known, although there's no direct evidence of early lathes until about 300 B.C. Writes the historian Robert S. Woodbury, "It seems quite clear that the lathe was in use as early as the eighth century B.C., probably as early as 1,000 B.C., and possibly even in 1,200 B.C. The place of its origin cannot be established, or even whether it had a single origin...possibly it was discovered independently by the Etruscans, the Celts and in Crimea." (*Studies in the History of Machine Tools,* Cambridge: The MIT Press, 1972.)

A few examples of treen survive from 17th-century America, along with thousands of objects from the 18th and early 19th centuries. The most durable woodenware to come down to us was turned from ash burl. Burl is more or less bowl-shaped as it comes off the tree, but man-powered lathes are not easy to work. I suspect it took about as much trouble to cut the burl and turn a bowl as it took to dig some clay, throw pots and fire them. Burl kitchenware is sturdier than pottery, until it gets on the wrong side of the moisture exchange. Then it's liable to crack wide open.

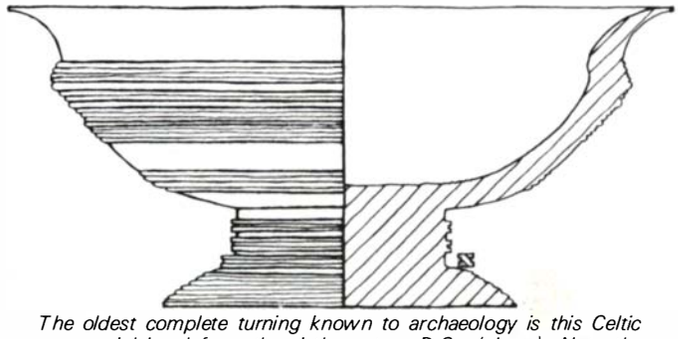
By 1850, industrial methods of forming clay, glass and metal had made turned wooden kitchenware all but obsolete. The craft of the turned utensil lingered in a few forms for which wood is particularly suitable (breadboards and rolling pins), as a hobby for grandpa, and in high-school shop class. Remember shop class? Lamp bases like sawed-off newel posts, nut bowls the shape of doggie dishes with green felt glued to their bottoms, honey-dippers drooling varnish?

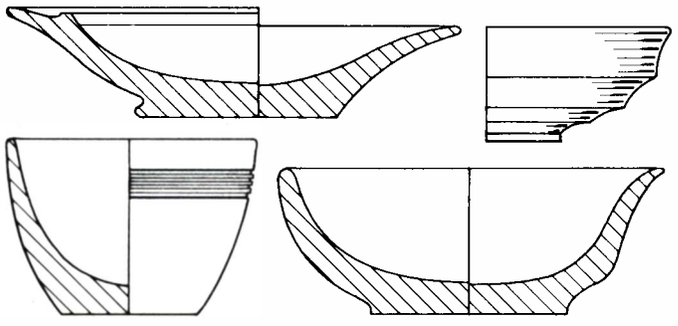
The lathe (along with the bow drill) is man's oldest machine tool. It's probably the safest (and certainly the quickest) way to make raw wood into finished things. Turning ornamental intricacies on the Holtzapffel lathe is highly jigged and thus more akin to metalworking than to woodworking; but for that Victorian excess, traditional woodturning is staunchly utilitarian, not the place for startling beauty, nor for innovation. Then during the 1940s, James Prestini conceived the delicately thin, perfectly shaped, turned wooden bowl.

The pioneer—James Prestini, at 73, is a sculptor of iron and steel. Among many other things, he's been a professor of design, a research engineer, a mathematician and a metalworker. For 20 years, from 1933 until 1953, he was a woodturner. Although he turned and sold hundreds and hundreds of bowls and plates, it was always a hobby for him, not a full-time profession.

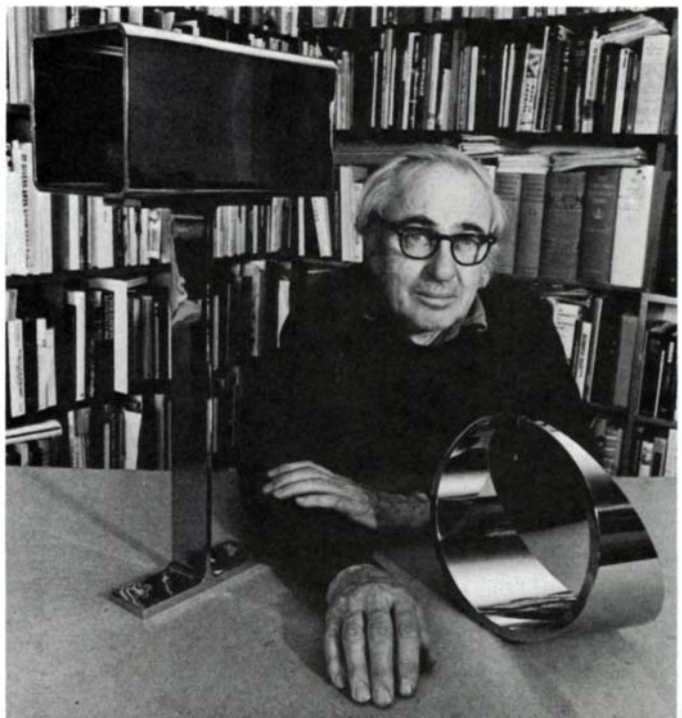
Prestini taught himself the woodturning trade by doing it. He entered the 3,000-year tradition, but he was not of that

Merryll Saylan (center) explains her turned sculpture, Jelly Doughnut, *during the Tenth Woodturning Symposium. The doughnut was assembled from eight mitered segments, seven of them of poplar and the eighth of red acrylic plastic.*

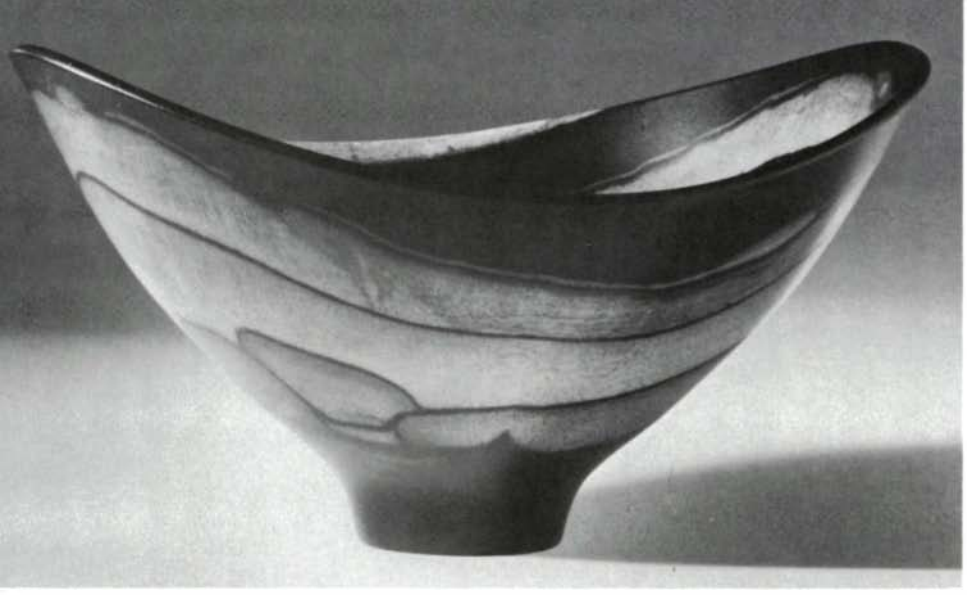




The oldest complete turning known to archaeology is this Celtic ceremonial bowl from the sixth century B.C., (above). Note the tooled decoration and the free-turned ring about its foot. Drawing adapted from Woodbury, Studies in the History of Machine Tools *(Cambridge: The MIT Press, 1972). Below, some traditional forms for utilitarian turned bowls, from Seale,* Practical Designs for Wood Turning *(London: 1964, reissued New York: Sterling, 1979.)*



James Prestini in his library, with two of his sculptures in nickel-plated steel: Construction No. 161, 24 in. high (left), and Construction No. 286, 10½ in. dia. Photo: Jonathan Reichek/Catalyst.



Decorative bowls by Bob Stocksdale, from his one-man exhibition held last year at the Oakland Museum. Left, a rare piece of Ceylon ebony, 7¼ in. across; right, osage orange bowl, 6 in. dia. Photos: Joel Schopplein.

tradition: he was not encumbered by utilitarian ideas about kitchenware. The shape of his turnings was startlingly new, as was their fantastic thinness. People admired them. But it is only from a distance of 40 years that we can see how they were the first of a new craft form.

Prestini was 25 when he took up woodturning. He'd apprenticed as a metalworker for two years, then studied mechanical engineering at Yale, and was teaching mathematics in Lake Forest, Ill. As he explained it in a recent interview, "My idea was to use making as a design resource, a different way to learn design. The usual way is to study the history of design, go to the library, have seminars. I tried to reverse things, to make the object first, then to draw it and think about it, then to make it again. This way a craft can teach you what information you have to communicate." In the late 1930s, the Bauhaus remnants under Laszlo Moholy-Nagy set up school in Chicago, then Mies van der Rohe came there to invent the glass-and-steel skyscraper. Prestini was in touch with both of them and became deeply immersed in the Bauhaus ideas about art and design, craft and industry. He says that in our technological era, his own humanity required him to develop the skill to turn wood as well as a machine could do it. But the shape of his bowls, which so impressed the Museum of Modern Art (p. 54), he shrugs off as easily derived from metal-spinning. "The important thing," Prestini says, "is not the product but the process. I'm not interested in turning a good-looking bowl, I'm interested in what does it take to turn that bowl? What do I have to learn to do?" And the main thing he learned, he says, "is that work is your best friend, it never fights back. I have reverence not for wood, but for work."

In other words, the real product was Prestini himself. In 1953 he began to work in metal sculpture because "there's so many things you can do with metal that you can't do with wood." His craft now part of him, Prestini-the-artist hires craftsmen who use advanced metalworking technology to build his sculptural conceptions.

During the late 1930s and throughout the 1940s, Prestini showed his bowls in museums and art galleries across the country, receiving considerable acclaim. Photographs of the bowls showed up in magazines, and the bowls themselves found places in many private and museum collections. People regarded their shape as an apt expression of streamlined modern times, and found it marvellous that they were turned from wood. They seemed as thin as china dishes, lighter than anybody had realized wood could be. Even so, serious woodturners who happen today upon an old bowl by Prestini see little that's remarkable. The woods are common birch, walnut, cherry and mahogany. A sharp eye finds sanding scratches. Many of them are variations of a single shape, a tautly convex curve from foot to rim, tilted more or less as the bowl widens. The thinness that seemed so magical when new is routine today, and nowhere near the limits of thin. The thing is, before Prestini perfected the techniques, nobody realized that such work could be done at all.

The professional—To the decorative bowl that Prestini discovered, Bob Stocksdale added the beauty of exotic woods from around the world *(FWW #4, Fall '76)*. And from that perfect silhouette, Stocksdale built both a family of shapes plus the skill to interpret a bowl's curve in terms of the wood itself. Where Prestini's bowls were in a way incidental to the process of becoming a designer, Stocksdale's purpose is more prosaic. Since the late 1940s, Stocksdale has been a professional turner of bowls and plates, his work at the lathe supporting his family. For many years and until quite recently, Stocksdale was probably the only professional turner of decorative bowls in America. Because of this, and because of the technical perfection of his work, Stocksdale has been an inspiration to dozens of aspiring young turners. He's been elected a Fellow of the American Crafts Council, and at 68 he's the grand old man of his field.

Although they live about a mile from each other in Berkeley, Calif., Stocksdale and Prestini are just barely acquainted. Stocksdale recalls seeking out Prestini about 25 years ago because he had admired the older man's work. Today Stocksdale says, "He's got only one shape, they're all the same shape."

The bowls shown above represent two of the shapes Stocksdale makes, in two of the hundreds of wood species he's turned. These bowls have become a technical standard in the craft—at exhibitions, you can see young turners studying Stocksdale's work and measuring themselves against it. Their wall thickness is between ⅛ in. and 3/16 in. There are no abrupt changes in thickness or in silhouette, inside or outside. There's no pimple or dimple at the center of the bowl, no torn end-grain anywhere on its surface, no sanding scratches, and no screw holes in the bottom nor any other trace of how the wood was held on the lathe (the secret weapon is a three-jaw chuck). The professional Stocksdale, working about 30 hours a week, can deliver about 30 such bowls a month.

The Exhibition

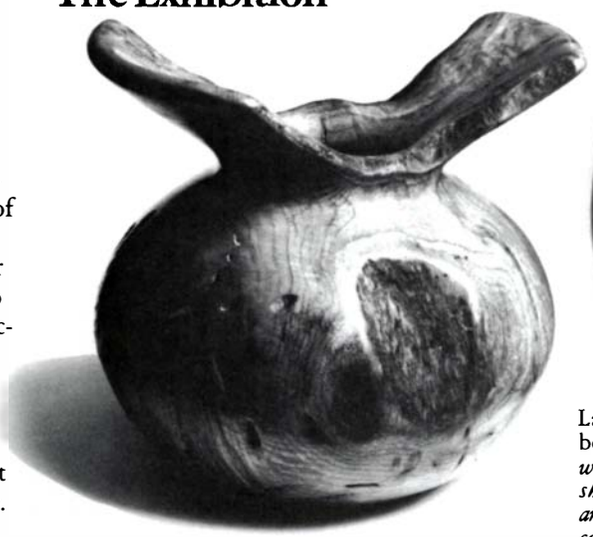
The innovators—Working from the basis that Prestini and Stocksdale created, a number of turners have invented or rediscovered aspects of the contemporary craft's vocabulary. Through the nine previous woodturning symposia and through the pages of this magazine, these innovators have freely given their discoveries and their techniques to anybody who wanted to know. Their generosity of spirit characterizes woodturners; it is one of the reasons for the rebirth of their craft.

Melvin Lindquist of Schenectady, N.Y., working with his son Mark, showed that you don't need to import logs from Africa to find exotic beauty. It's right there on the ground, inside partially rotted logs of New England maple, elm and birch. The Lindquists' early work was turned away from craft fairs, but their persistence unleashed spalted wood upon the world *(FWW* #7, Summer'77, p. 50) and over the years they have perfected methods of turning this difficult material *(FWW* #11, Summer'78, p. 54).

Spalted wood can be turned only when the worker does not insist upon making functional kitchenware. It is a decorative material. But once you add spalted wood to the tradition of turning burl, and if you can accept mere existence as function enough, you can turn (and find beauty in) any bit of wood, no matter how worm-eaten, bug-infested, rotten or scabrous. These are either new ideas or newly popular ideas—I recently met an English master craftsman who was just shocked by the notion of turning rotten wood. After he'd spent a little time with a finishless, worm-eaten plate by Dale Nish (right), he came to agree that this new attitude could indeed uncover remarkable beauty.

Along with Rude Osolnik of Berea, Ky., Mel Lindquist was among the first to realize that a turned object doesn't require a pristine rim. Instead, its edge can reveal the original outside of the tree from which it came—a shape the turner does not create, he only selects and preserves. Then about the same time as David Ellsworth of Bucks County, Pa., Mel Lindquist rediscovered the 19th-century techniques of turning hollow, narrow-necked bottles through their neck openings *(FWW* #16, May'79, p. 62).

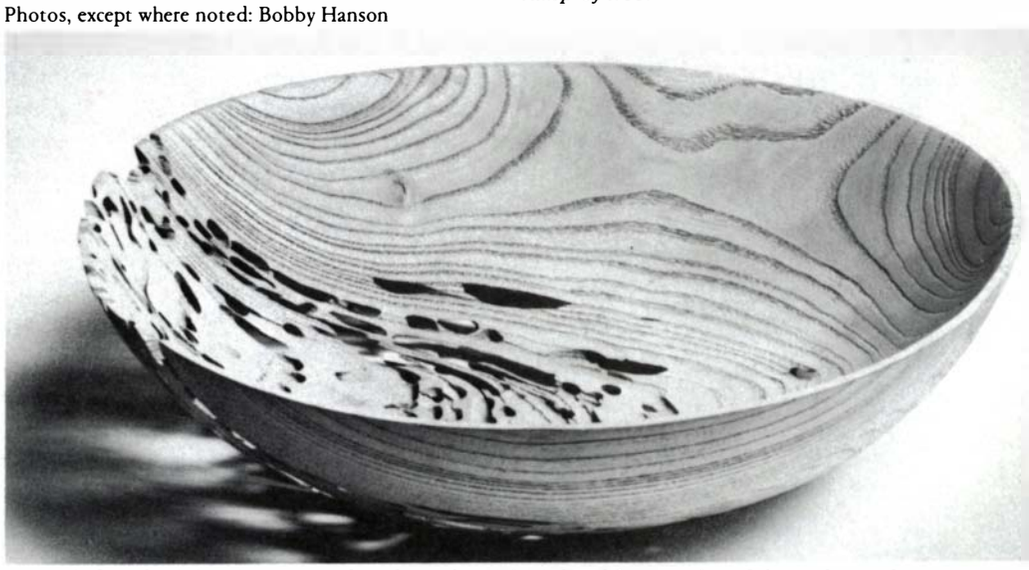
Finally, Stephen Hogbin of Owen Sound, Ont., has shown how to escape from the lathe's circular nature, by cutting and reassembling turned elements into new forms *(FWW* #21, March'80, p. 56). Hogbin's work points always toward what else might be done, if the turner keeps eyes and mind open.



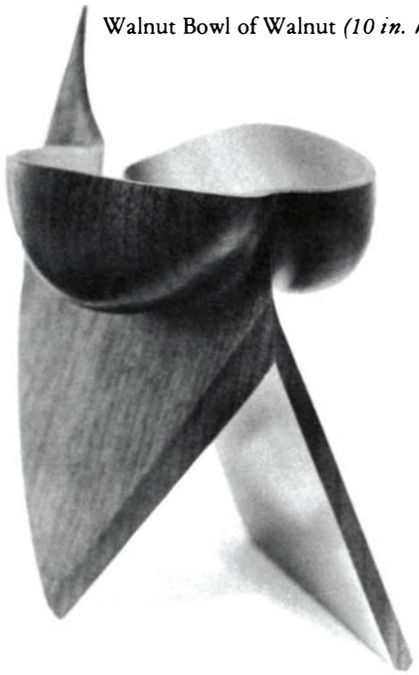
English walnut bowl *(10 in. dia.) by Melvin Lindquist combines the natural edge with the hollow bottle form. The turner cannot impose a preconceived shape on wood like this, but must see an appropriate shape within the log.*

Laminated mahogany and birch plywood bowl *(6 in. high) by Rude Osolnik. Osolnik, who with David Ellsworth chose the pieces shown in the Turned Objects Exhibition, is an exceptionally versatile craftsman. He is as comfortable with burls and gnarly roots as he is with the controlled materials and forms displayed here. But the various methods of laminating blanks for turning* (FWW *#29, July'81, p. 52) do not find much favor among the younger craftsmen, who would rather find and saw a suitable lump of tree.*

Photos, except where noted: Bobby Hanson

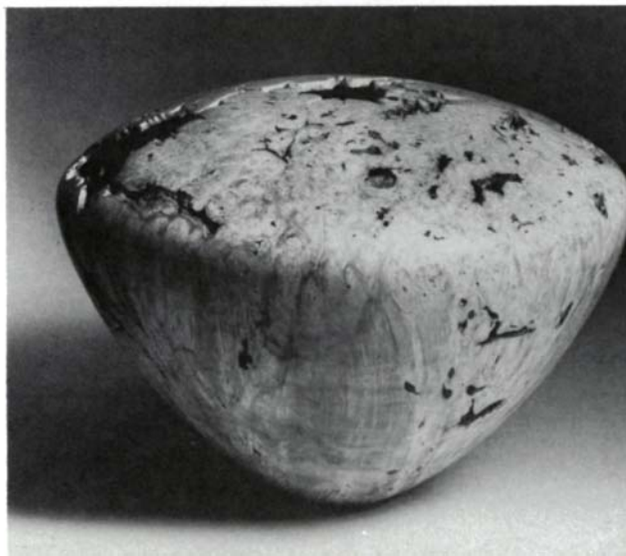


Worm infested ash bowl *(13½ in. dia.) by Dale Nish. A bowl from such awful wood can't be functional. This one was turned, and exists, for its own sake—for what it shows about wood, about worms, and about Nish.*



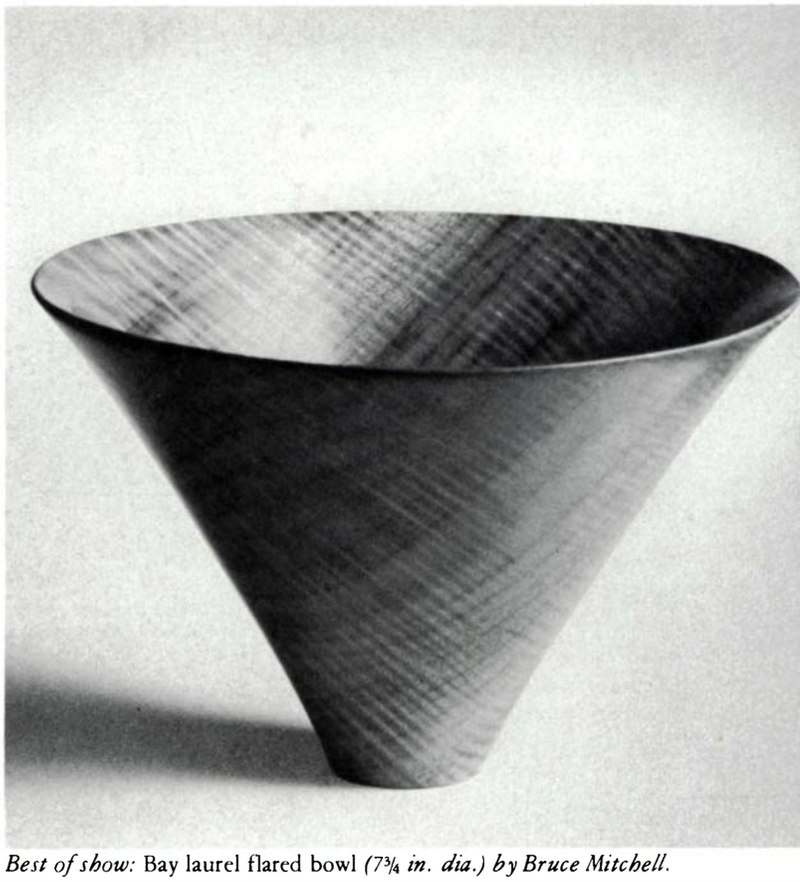
Walnut Bowl of Walnut *(10 in. high) by Stephen Hogbin. Photo: Staff.*

Box elder cluster burl *bowl (10 in. dia., 7½ in. high) hollow-turned by David Ellsworth. Like the blown shells of ostrich eggs, Ellsworth's hollow turnings can startle and amaze. It's difficult to imagine their lightness, or to believe that a piece of wood can be hollowed out through such a small opening. Nonetheless, this turning is completely hollow, with walls no more than ⅛ in. thick.*



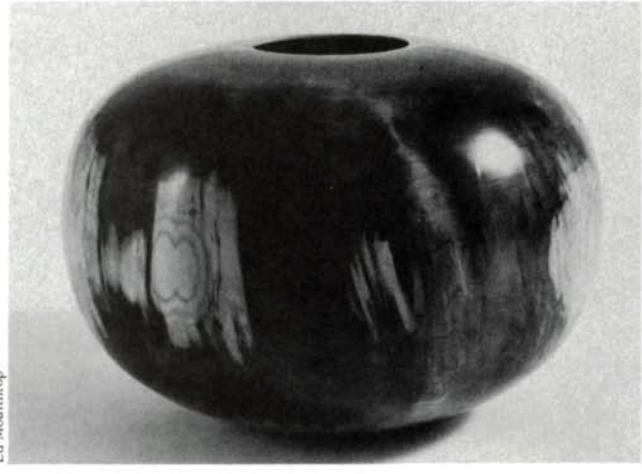
The ideal bowl—Professional turner Bruce Mitchell of Inverness, Calif., won the "Best of Show" ribbon for his bay laurel flared bowl (7¾ in. dia., 5¼ in. high). Mitchell contrived to saw the blank, orient the axis of rotation and choose a shape that allowed the wood's fiddleback figure to squarely criss-cross its annual rings at every point on the bowl's surface, inside and out. The turning is correctly thin and skillfully flawless: no screw holes, no torn grain, no sanding swirls.

Juror Ellsworth said all of this still made it only another pretty bowl among many. But these qualities together with the precision of its taut silhouette made Mitchell's piece an archetypal symbol of the fond hopes of all the woodturners, and a perfect summary of the craft's recent evolution. Thus it won the prize, and most of the turners seemed to agree. But during the symposium debate several artisans declared Mitchell's silhouette a cliche, tritely modern, as dated as Prestini's shapes, nothing new and nothing inspiring here. Thus the bowl earned its prize again, by serving as the touchstone for a long and thoughtful discussion of the bowl-turning craft among the symposium participants: What good is a bowl such as this? Could you ever serve candy or pickles in it? Where would you keep it, besides on a pedestal? Is it purpose enough for a bowl to be a beautiful expression of nature's wonder, revealed by human skill? Does this make it art, or does art require newer and more profound insights? For myself, the bowl's beauty is its function, and I would give it a pedestal. But it is not the same as art. It is proud craft, admirably good craft, and that's enough for a bowl to be.



Best of show: Bay laurel flared bowl *(7¾ in. dia.) by Bruce Mitchell.*

Tulip poplar sphere bowl *(36 in. dia.) by Ed Moulthrop.*



Ed Moulthrop

Bowlus Fecundus *of Burma teak (9 in. dia.) by Marilyn Scott.*

Besides thinness—Turning a little bowl with coin-thin walls is a technical skill that separates the novice from the master. Thinness is now the aesthetic main line against which other types of bowl turning are judged. But there is more to this craft than thinness.

Ed Moulthrop of Atlanta, Ga., goes to the extreme of size. His tulip poplar spheroids range from 12 in. in diameter to 36 in., tree wide, always turned with the pith on the axis of rotation. They're usually the same squashed-sphere shape, fully hollow inside but with relatively thick walls. After rough-turning the green wood, Moulthrop stabilizes it with a long soak in polyethylene glycol, then completes the turning and sanding and applies an epoxy finish. Moulthroup is an architect turned professional turner who makes lots of these things. Whenever he puts together a gallery showing, it sells out. If you put your ear to the turning's opening, you can hear the sound the tools made when cutting into the whirling wood.

Marilyn Scott of Toronto, in this Burma teak turning she calls Bowlus Fecundus, confronts the notion that it has to be thin to be good. Although Bowlus is very thin at its rim, the walls get thicker as Bowlus gets deeper. Looking into it is like looking into a bell. You think you can lift Bowlus by grabbing its lip between thumb and

forefinger, but you can't. You have to cradle it in two hands. Scott reminds us that mass and bulk are inherent characteristics of wood, whereas thinness is characteristic of porcelain or sheet metal. By embracing wood's mass, Scott has made a friendly fat thing to contain something special.

Carving goes well with turning, thereby generating another fresh universe of possibilities. Lottie Kwai Lin Wolff of Madison, Wis., carved the rim and interior of her thumbprint bowl, while Bill Hunter of El Portal, Calif., disc-sanded spiral flutes into his rosewood spheroid.

Del Stubbs of Chico, Calif., breaks away from the bowl by putting a tight-fitting lid on it. He's been making his living for four years by turning delicate little boxes; this one, in California walnut, is 3½ in. high. The lids of most turned boxes are smoothly sanded into the shape of the box itself, the join all but invisible. Stubbs avoids this easy way out, and accepts the difficult challenge of turning two related forms that fit harmoniously together. Part of the reason for his success is pure skill—Stubbs cuts surfaces and tiny beads that need only the finest sanding.

Bert Lustig of Berkeley Springs, W. Va., breaks the bowl upward, with a daringly deep vase form of black walnut, made special by its free edge. Lustig won a merit award.

William Patrick of Arlington, Vt., is among several professional turners who aren't stuck on the one-whole-piece-of-wood idea. Patrick sees the surface of a turned plate as a canvas for expressive drawing. He is exploring the color palette available in world hardwoods, and the shape-vocabulary made possible by the bandsaw; Patrick glues the picture together, then turns the plate. This example is zebrawood, mahogany, walnut, ebony and amaranth, 11 in. diameter.

Thumbprint bowl *of mahogany (7 in. dia.) by Lottie Kwai Lin Wolff.*

Spiral *(5 in. dia., 2 in high) by Bill Hunter.*

Bowl form *of black walnut (4½ in. dia., 8 in. high) by Bert Lustig.*

Covered jar of California walnut (5½ in. dia.) by Del Stubbs.

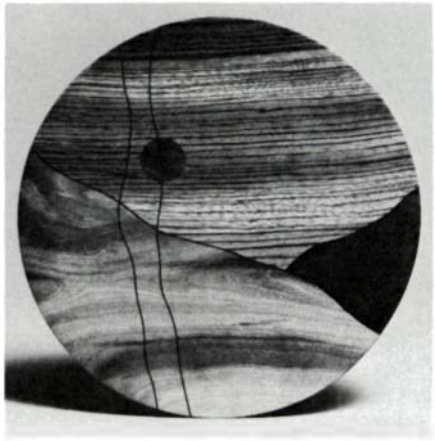


Plate *(11 in. dia.) by William Patrick.*

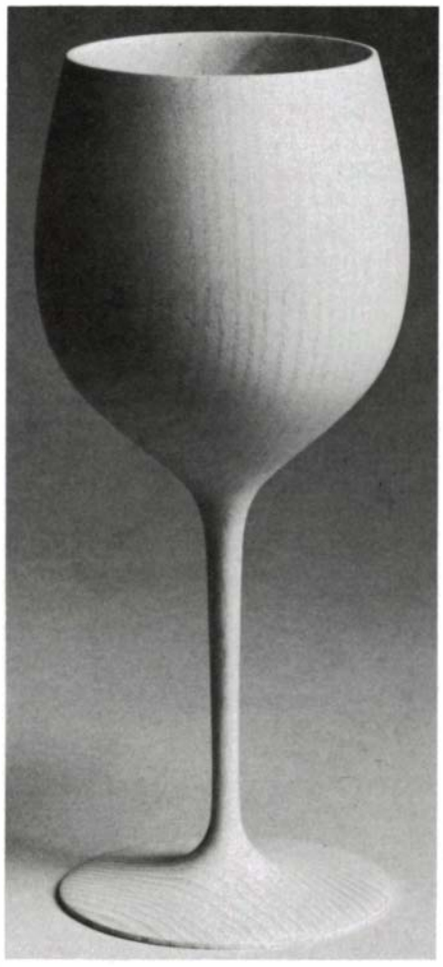
Vermilion bowl *(11 in. dia.) by Tom Eckert.*

Wall-mirror-table with clock *(28 in. wide, 20 in. high, 14 in. deep) by Robert Leung.*

Beyond bowls—As Scott's Bowlus enriches everyday life, Tom Eckert's vermilion bowl with bronze detailing and a skirt of orange feathers suggests a ceremony. The texture and color of the feathers against dark, purple-brown wood tempt you to touch, they make the bowl important, magic and mysterious: what relic lives here? May I peek?

Eckert, who teaches design and woodworking at the University of Arizona in Tempe, is no pilgrim at the shrine of the tree. He uses the lathe to explore forms and functions in other materials besides wood, in his own search for meaning. Turning technique and the wood's figure are secondary to Eckert's larger aims, so he doesn't mind a vertical glueline through the lid's knob. To me the glueline is a distraction that diminishes the mystery of the piece, making it seem ordinary again.

Robert Leung, a student in San Bernardino, Calif., assembled his wall-mirror-table from several koa-wood turnings. There's a clock at top center and two trapezoidal drawers under the shelf. Leung's turning suffers technically from end-grain tear-out, and his joinery is ratty, but the jurors still gave him an honorable mention. He deserves the encouragement, for Leung is not working in the well-known territory of bowl turning. He's plunging off into exploration of the lathe as a tool for making parts, a class of turning (and of furniture design) toward which Hogbin pointed but which remains unexplored. In this piece Leung has broken the sacred circle that came off the lathe, while restoring the circle by reflection in the mirror. The mirror glass peeping through the ring space in its frame makes ambiguous the boundary between glass and wood, between solid object and mirage. Leung is at the beginning of a journey,and it will be fascinating to see where he goes.



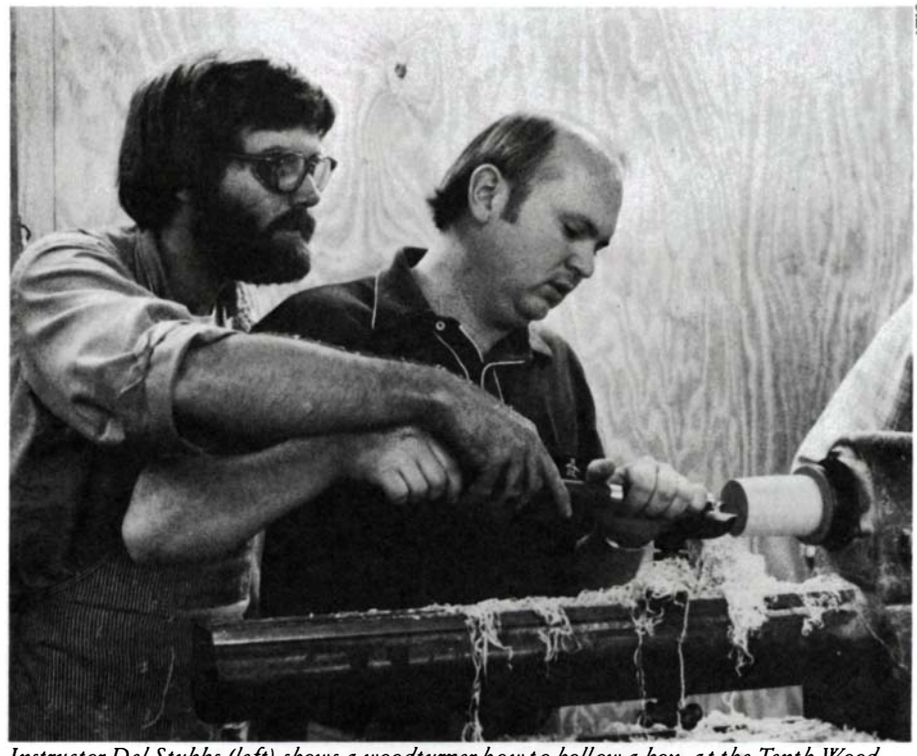
Translucent Goblet in Wood, *by Robert Street.*

The ghostly goblet—Bob Street of Aberdeen, Wash., an architect and amateur turner, turned this translucent goblet of Western ash, 7 in. high, 3 in. dia., 1/32 in. thick. It's a soft white ghost of a thing, weighing a mere 1.2 ounces. It has no finish, so it could never hold wine. All it can hold (along with your attention) is a yellow-orange glow when it's put next to the light.

Street's goblet came to be my favorite piece among the 100 Turned Objects in the exhibition. The wood he chose is the straightest imaginable, no hint of flashy grain. The form he chose is that of the common wine glass. The result transcends extravagantly figured wood and novel form by demonstrating that wood, the most rigid of materials, can achieve the delicate shapes of that most liquid material, blown glass. Thus it celebrates, in the humblest of materials, the limits of human dexterity. It was daunting to learn that Bob Street turned not just one goblet, but three of them, and then it was heartening to find out that the second and third took him much longer than the first. I'm glad I never saw more than one goblet at a time. □

Last Was Best

by Richard Starr



Instructor Del Stubbs (left) shows a woodturner how to hollow a box, at the Tenth Woodturning Symposium. The gist of Stubbs' hands-on demonstration was to practice positioning the tool to cut while the lathe is turned by hand; the noodles of shavings on the lathe ways prove that if it cuts right slow, it will cut right fast.

Since he started the first woodturning symposium five years ago, Albert LeCoff has collected interesting woodturners the way other craftsmen collect special pieces of wood (*FWW* #3, Summer'76, p. 44 and *FWW* #19, p. 72). By the fourth or fifth symposium, LeCoff had visited everyone he could find who was doing outstanding work on the lathe, and had recruited most of them as symposium instructors. Meanwhile, talent was emerging spontaneously from among the hundreds of symposium participants. It became apparent that a new degree of interest and a new level of technical skill was developing in this craft. Who could say whether these symposia were just riding the crest of the wave, or were actually creating the wave?

Each weekend symposium was limited to 50 participants with five instructors and 25 lathes (although by Sunday the crowd had usually swelled to 75 or more). The directing troika were volunteers: Albert LeCoff, who designed the program and collected the talent; his twin brother Alan, who managed the business logistics; and Palmer Sharpless, woodworking teacher at the George School in Bucks County, Pa., who made his school's shop available and mobilized the tools and lathes needed for hands-on experience. The three emphasize that their whole five-year operation never had any formal structure, no corporation, nonprofit or otherwise, no foundation funding nor any other kind of bankroll. By charging participants a reasonable fee (which has ranged from $35 to $125), the first nine symposia paid for themselves, if only barely.

The spirit of LeCoff's method was easy, informal exchange of information and ideas, plus deliberate diversity. Says LeCoff, "I've always felt that there is more than one approach to any woodturning topic. That's why all the symposia have had five or more instructors, always different people. If one instructor was a sculptor, I'd be sure that another was a production turner. A participant might decide to come for the production turner's techniques. Then he'd get hit when he wasn't looking by a guy with a sculptural outlook. It'd start him thinking about the forms he was turning, not just how he was doing it.

"Turners have come a long way in technique since we started," LeCoff continued. "But we've also gone from looking at *how* things are made to *why* they're made. We used to look at the bottom of turnings to see how screw holes were filled. Now we also look at the objects themselves."

LeCoff conceived the 10th symposium as a climactic recapitulation of the entire series, with all previous instructors invited to return. A state-of-the-art gallery show would inspire the participants, then the show might go on tour for a couple of years to enlighten the public. A Herculean task, it all finally happened as planned. It was wonderful, but the event left the LeCoff brothers exhausted, $15,000 in the hole, and ready to let others take over. Two weeks later, LeCoff could be philosophical about the financial loss and ready to talk about new challenges. Though he plans no future symposia, he is satisfied that the original series of nine has encouraged similar events in turning as well as in other areas of woodworking. "It seems like everybody is doing workshops, and it's great," LeCoff said. "For example, there are events at Provo, Utah, Berea College in Kentucky, and at Memphis State in Tennessee, using pretty much the format we pioneered. Since other people are doing them, there are new things I can do now. I'm concerned with making the marketplace more aware of what's happening in woodworking and I've got some ideas about how to do it. I'm also thinking about a permanent site for workshops, maybe even a school. I'd have to find some sponsorship, maybe a college or corporation, to back me up."

What began as a low-key gathering of craftsmen seemed to have become a permanent institution. But at the summing-up session on the last day of the tenth symposium, Albert LeCoff announced that this was the end, there would be no more. Most of the participants were astonished by this news, and several seemed willing to pick up where the weary three, Albert and Alan LeCoff and Palmer Sharpless, were leaving off. □

Albert LeCoff and photographer Bobby Hanson have put together a catalog of the Turned Objects Exhibition. It costs $7.95 from Brigham Young University Press, 205 UPB, Provo, Utah 84602. The exhibition, all 100 turnings, is ready to travel around the country but it costs a few thousand to crate, insure and ship, and it can't budge without local sponsors. To find out more about the exhibition, contact Albert LeCoff, Amaranth Gallery and Workshops, 2500 N. Lawrence St., Philadelphia, Pa. 19113.

Timber

What it means to cut a tree

by George Nakashima

This venerable English oak in Sherwood Forest, Nottinghamshire, England, is at least four hundred years old and has a diameter of about ten feet. This oak seems to have started life in the open. A forest tree has a longer butt since, when young, it must stretch for sunlight. Many nations designate trees like this one as special natural monuments, but perhaps they should go further and call them "National Living Treasures." These treasures should be cut with reverence when their life span has been fulfilled. Their aged beauty and great character must be preserved in objects built of their wood to provide a record of their heritage and history.

When trees mature, it is fair and moral that they are cut for man's use, as they would soon decay and return to the earth. Trees have a yearning to live again, perhaps to provide the beauty, strength and utility to serve man, even to become an object of great artistic worth.

Each tree, every part of each tree, has only one perfect use. The long, taut grains of the true cypress, so well adapted to the making of elegant thin grilles, the joyous dance of the figuring in certain species, the richness of graining where two large branches reach out—these can all be released and fulfilled in a worthy object for man's use.

How to acquire logs and what to do with them calls for creative skill. There is so much that is wasted and unrealized. Consider the great timbers, some ten feet in diameter, piled across slopes and gulleys to make railroad beds in the early days of this country. Or the magnificent zebrawood log, from which boards fully four feet wide and eight feet long could be cut, but which instead is cut into pieces ⅜ in. thick, six inches wide! What a waste of a majestic opportunity! This is the psychology of match-stick manufacture. And the tragedy of once-in-a-lifetime timbers cut into veneers so thin the light can shine through. What a waste, simply for money!

Logs from all over the world make their way to my storehouse. Some are of great value, some quite inexpensive but with interesting possibilities. There is need always to select and to search, even to look underground where the most fantastic grains can often be found.

Each species of tree has its own characteristics. Extremely long fibers and resistance to rot are characteristics of the cedar, the cypress, and, in a way, the spruces and hemlocks, the firs, and the other evergreen trees. These characteristics are important where tautness and resistance to weather are necessary. The woods from these trees often have beautiful, very straight graining and are useful in architecture for grilles like the starburst *asa-no-ha*, and even musical instruments. One of the finest perhaps is the Japanese cypress, and not far behind are the Port Orford cedar and the Alaska cedar, neither of which is a true cedar at all, but a cypress.

The European walnut, whether from Kashmir, the area around the Caspian Sea, southern Russia, northern Iran or eastern Turkey, or from western Europe, is among the finest of furniture woods, and one I use with frequency. American walnut, a different species, is also greatly admired, especially by Europeans at this time.

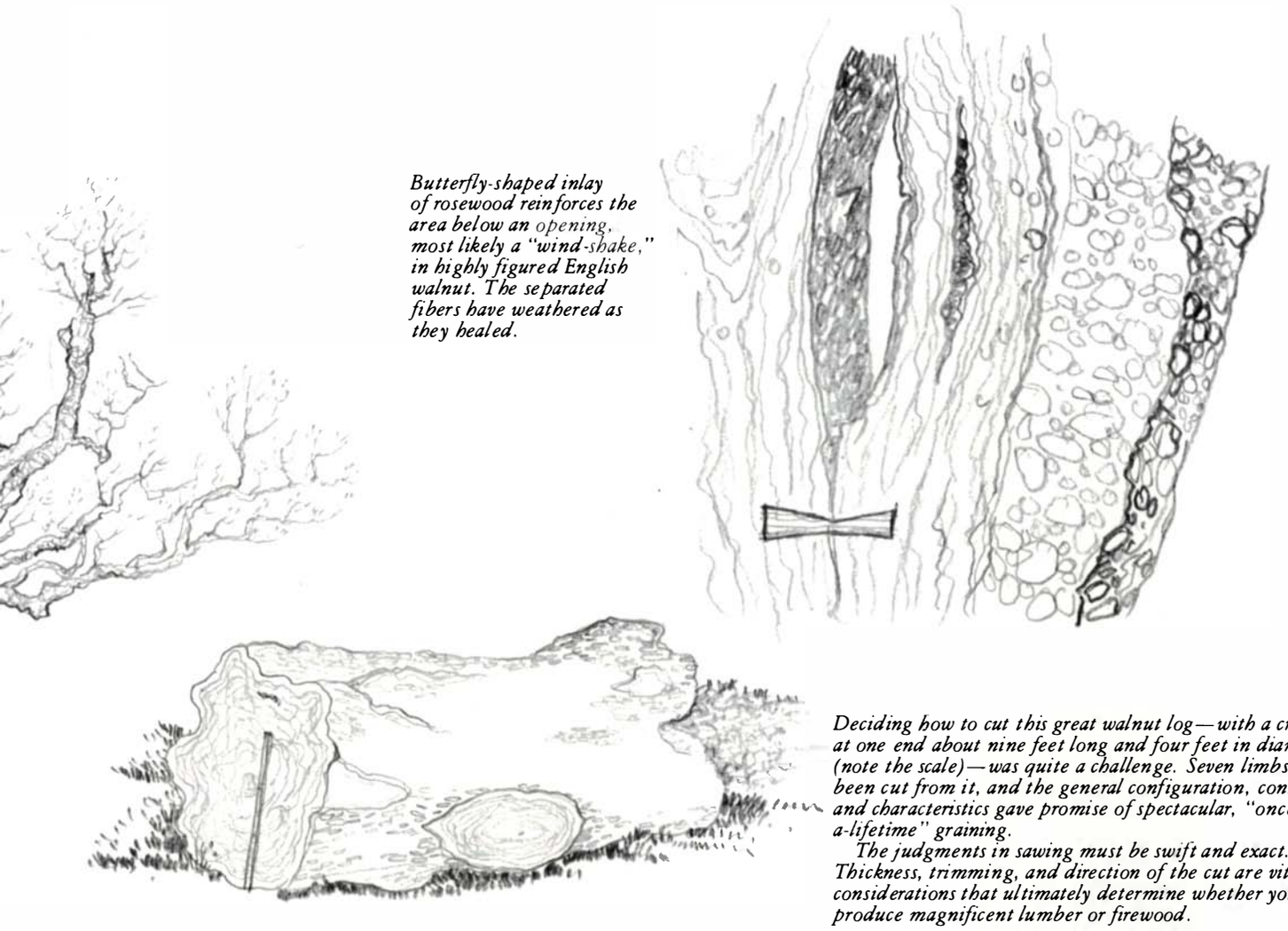
Cherry and other fruitwoods produce material of great quality. Black persimmon, often considered the finest of Japanese woods, is now extremely rare.

All woods have graining—patterns created by the trunk fibers. However, the grain of many woods, pine and maple for instance, is regular and comparatively uninteresting, while that of walnut, cherry and other fruitwoods is intricate and exciting.

Quite often the finest of grains exist in the root structure of many fine trees that are condemned to rot. The roots are difficult to pull out, and often are deeply imbedded with stones which can be the nemesis of a sawyer. Some roots preserve their beauty even if left underground for a hundred years, for example, those of the California redwood.

Burls, growths on the trunks of many trees, in the shape of flattened hemispheres, are also very much esteemed. Sometimes they grow in a single clump, but at other times they may cover most of a tree. They do not seem to be particularly harmful to the health of the tree, and they seem to have a joy and exuberance that greatly enhances the tree's charm.

EDITOR'S NOTE: George Nakashima's furniture is special because it is not designed in the objective sense. Rather, it evolves in the subjective organic sense, and it stands at the end of its manufacture as a record and symbol of the natural forces that created the wood, as well as of the human understanding that gave it new life as a useful object. Nakashima works in the tradition of Karma yoga, and thus he is concerned with the active process of bringing objects into being, not for the sake of what they become at the end of it all, but for the sake of the work itself, for the interplay and rapport between maker and material. As a maker, Nakashima believes his chief job is to read each log with a knowing eye and to have it cut to unlock its essence. In this excerpt from his new book, *The Soul of a Tree* (Kodansha International Ltd., 10 E. 53rd St., New York, N.Y. 10022, 1981, $52), Nakashima illustrates and discusses his relation to his material. In other chapters in the book he talks about the formative influences on his career as a designer and how he creates balance between useful and natural forms. For more on George Nakashima see *FWW* # 14, Jan. '79, p. 40.



Butterfly-shaped inlay of rosewood reinforces the area below an opening, most likely a "wind-shake," in highly figured English walnut. The separated fibers have weathered as they healed.

Deciding how to cut this great walnut log—with a crotch at one end about nine feet long and four feet in diameter (note the scale)—was quite a challenge. Seven limbs had been cut from it, and the general configuration, contour and characteristics gave promise of spectacular, "once-in-a-lifetime" graining.

The judgments in sawing must be swift and exact. Thickness, trimming, and direction of the cut are vital considerations that ultimately determine whether you produce magnificent lumber or firewood.

The sawing of logs is of prime importance. Each cut requires judgments and decisions on what the log should become. As in cutting a diamond, the judgments must be precise and exact concerning thickness and direction of cut, especially through "figures," the complicated designs resulting from the tree's grain. If a figure is cut properly, the beauty locked in the tree will gradually emerge. If cut improperly, most is lost. Gradations in color, owing to the chemical composition of the soil in which a tree grows, as well as the sharp contrast between dark heartwood and light sapwood, will add their charm.

There is drama in the opening of a log—to uncover for the first time the beauty in the bole, or trunk, of a tree hidden for centuries, waiting to be given this second life. There are fine surprises, but also disappointments.

A great walnut, above five and a half feet in diameter, was once given to me. It seemed to have great character. A small limb pocket was filled with concrete at the top but neither a tree expert nor I imaged that the whole center had rotted out and was filled with concrete! There was only a foot and a half of wood around the circumference. The tree had not fallen because it was a concrete column! We were finally able, with great effort, to take it down. The wood was interesting, but like many aged logs it had a tendency to be soft and weak.

I recall another instance when two logs were on the platform ready for sawing. They were English walnut. At first, there was only a suspicion that we were in the presence of a great natural wonder. The saw was a large, commercial band saw. The logs were close to six feet in diameter. They were too large! The only recourse was to hack off protrusions and excess width with a chainsaw and an ax. It was devastating to see this magnificent wood handled in such a fashion, but there was no other way. Even before the log was opened up, the experienced eye could see the incredibly lovely grain, figuring and color where a bit of bark had been knocked off. Here indeed was precious timber.

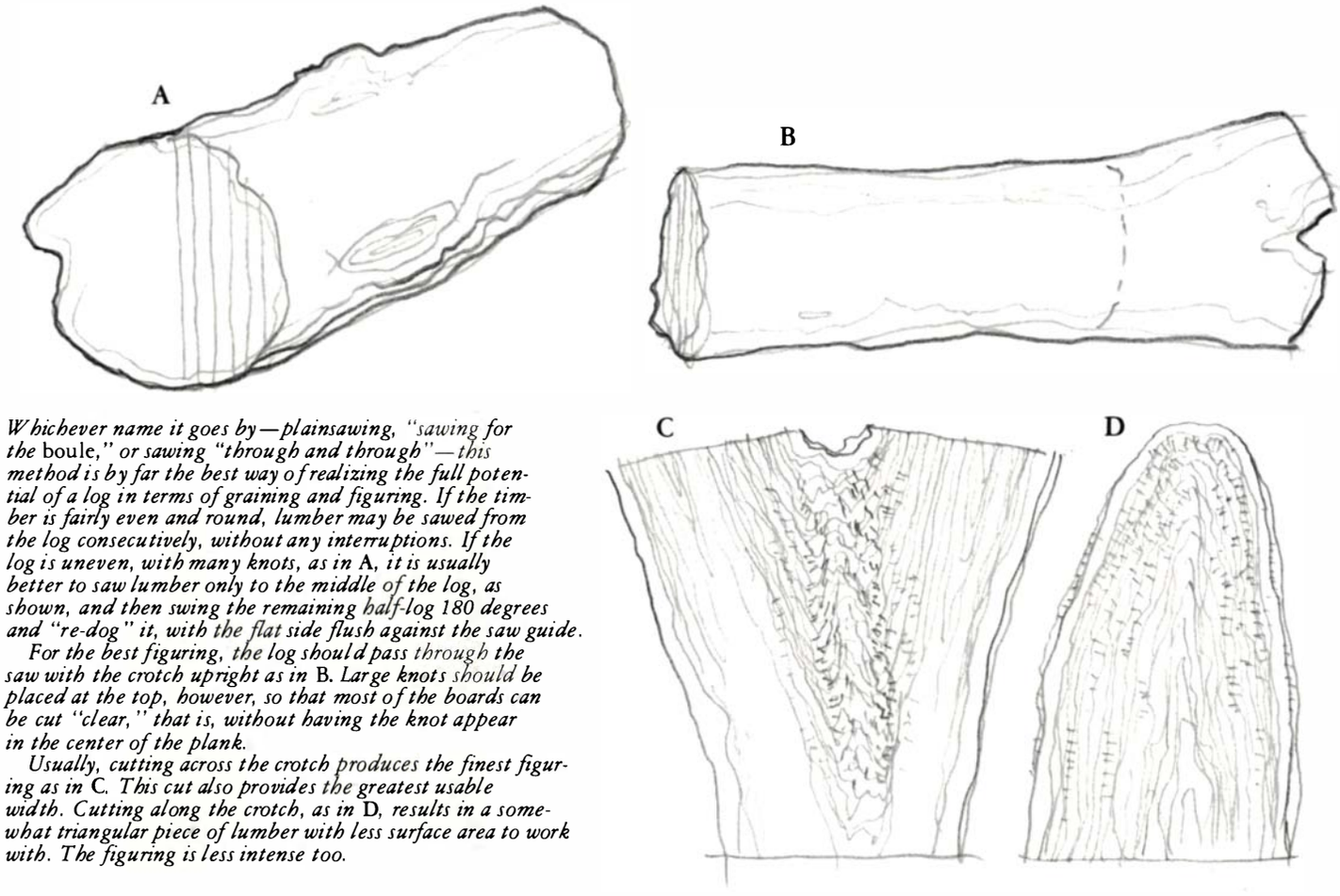
The revelation in the opening of the log with the first cut or two was amazing. Sensitivity, instinct and long experience came to the fore at this point. The graining and the quality of the slabs made them an English treasure. One wonders why the English timber merchants allowed these logs to leave the country. Not being able to cut the full width of the prime boards was a disappointment. I even considered calling several hand sawyers from Asia to execute the sawing.

Although we could not realize the full potential of these logs, they were of amazing quality, with a graining that would never happen again. We were able to cut boards about four feet wide and seven feet long, each board unique, each board magnificent.

The key man in the process of cutting logs is the sawyer, one of the great craftsmen of our age with steady nerves and experienced judgment. It is necessary to have an almost silent dialogue with this sawyer. Few words are spoken, but thickness, the direction of the cut, the positioning of the log—all must be decided with precision.

During a day we saw perhaps thirty logs, some giant in size, each different from the others. Each must be analyzed to produce its full potential. As the hours pass, a silent symphony of visual tones unfolds, the beautiful expressions of nature's treasures, an occasional crescendo where the beauty

Minguren I coffee table made of book-matched English walnut root. The full page shows a detail of the free edge. Boards made from roots are difficult to book-match both because roots tend to dry irregularly and because the grain can—and does—run every which way. Photos: G.W. Holland.



Whichever name it goes by—plainsawing, "sawing for the boule," *or sawing "through and through"—this method is by far the best way of realizing the full potential of a log in terms of graining and figuring. If the timber is fairly even and round, lumber may be sawed from the log consecutively, without any interruptions. If the log is uneven, with many knots, as in* A, *it is usually better to saw lumber only to the middle of the log, as shown, and then swing the remaining half-log 180 degrees and "re-dog" it, with the flat side flush against the saw guide.*

For the best figuring, the log should pass through the saw with the crotch upright as in B. *Large knots should be placed at the top, however, so that most of the boards can be cut "clear," that is, without having the knot appear in the center of the plank.*

Usually, cutting across the crotch produces the finest figuring as in C. *This cut also provides the greatest usable width. Cutting along the crotch, as in* D, *results in a somewhat triangular piece of lumber with less surface area to work with. The figuring is less intense too.*

touches one's heart. There is nothing like it. The workday finally ends. I am exhausted, but happy to have witnessed this unfolding spectacle.

How thick a plank should be depends chiefly on the diameter of the log. To avoid splitting, wide planks are cut relatively thick. Trees usually grow vertically without twisting, but sometimes they grow in a spiral. Some trees change direction, twisting a few years clockwise and then counterclockwise, making a natural plywood. A tree that grows in a spiral must be cut extra thick to prevent warping. Sometimes outside cuts are thicker still to prevent cupping.

Cutting logs is a great responsibility, for we are dealing with fallen majesty. There are no formulas, no guidelines, but only experience, instinct and a contact with the divine.

Commercial grade sawing by rolling the log, the method used with almost all hardwoods in this country, is one of the most barbaric of practices. No attempt is made to bring out the log's inherent beauty. No slice is wide enough to do justice to the tree's figures and graining. The potential of the log is lost, and it ends up only as expensive yet uninteresting lumber. Quartersawing—sawing parallel to the rays which radiate from the log's center—is also popular. And it too is undesirable since it is wasteful and also fails to make full use of the log's width with its great potential for spectacular figuring.

The proper way to treat fine timber is to cut for the *boule*, starting from one side of the log and cutting through it without slabbing or squaring the log. This method of sawing is also known as "sawing through and through." If the log is a proper shape, with no unusual branching, and the equipment appropriate, this can readily be done.

Some trees in particular should be cut at the precise moment of maturity. Then the curing and drying should begin. The sapwood of American walnut is quite white when freshly sawn. A gradual process of graying takes place in the weathering until only a thin strip of white is left next to the heartwood. This is the moment for the most gracious of grains. A short while later the white is gone, and all becomes gray and less interesting. For some woods, like cherry and ash, the air drying should last only a few months, as after that an unattractive blue stain sets in. Other species are almost indestructible. I recently cut a magnificent rosewood which must have been left out to weather for about a dozen years.

The best lumber should be air-dried for one or two years, the rate of drying depending on factors such as the species, the season and the climate. In India, where it is dry and hot, the drying time can be short.

The best time to log and saw is during the fall and winter, when the weather is cool and the sap is not rising. The final process is to kiln dry, which removes the excess moisture and "sets" the grain. Kiln drying of raw lumber produces unnatural-looking lumber. To rectify the "raw" look of kiln-dried lumber, it is often steamed with sawdust to produce a "mature" appearance. More often than not this process "kills" the grain and produces a dead-looking wood.

Planks and boards are the stock of the woodworker's trade. We store them in sheds in *boule* form, all the planks cut from a log grouped together. We memorize the qualities and potential uses of all of them. Planks are best stored upright, since it is easier to leaf through them. Selections are made as required and taken to the shop.

These rough but majestic "bodies" go on to be made into objects to enhance the lives of men. □

Wooden Bar Clamps

How to make these essential tools

by Tom Gerson

For edge-joining boards and gluing up frame or leg/rail assemblies, sturdy and stable bar clamps are indispensible. The trouble is that a really good bar clamp can cost upwards of $40, depending on its length, and to equip a shop with a couple dozen of these could mean a thousand-dollar investment. Many woodworkers try to get by with pipe clamps, but though these are comparatively inexpensive, they are cumbersome and the pipes bend easily, their jaws wobble, and they never seem to want to lie flat and steady on your glue-up table. Give one a nudge and it will fall over.

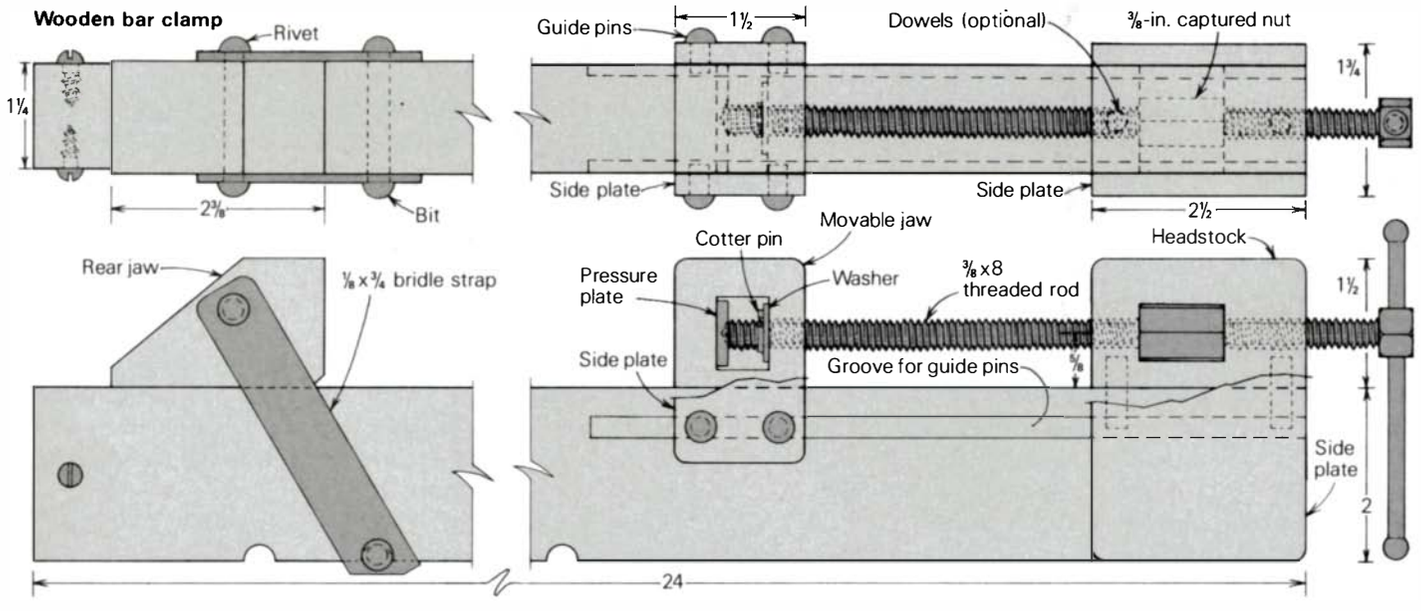
The solution is to make your own bar clamps. Shown here are some very practical and inexpensive homemade bar clamps that have been in use for nearly ten years and are still going strong. Their bars are flat and stable, their jaws stay consistently perpendicular to the bars, they sit flat on a table and they will not easily flop over. These clamps consist of a rectangular-section hardwood bar, a headstock which houses a nut for a threaded rod, a movable front jaw powered by the rod and an adjustable rear jaw whose bit and bridle allow it to be secured at 1-in. intervals along the bar.

The bar—Material for the bar can be any strong, close-grained wood. The clamps shown here are of cherry and maple. You can use the same wood to make the other parts of the clamp. The stock must be dimensioned 1¼ in. thick, 2 in. wide and as long as you choose, though you should increase the sectional dimensions for clamps longer than 24 in. The half-holes along the bottom of the bar are bored by clamping two bars together, bottom to bottom. Using a ⅜-in. machine spur bit in the drill press, bore exactly through the line of juncture between the two beams. Spaced 1 in. apart, the half-holes will provide plenty of rear-jaw adjustment.

The headstock end of each bar must be grooved on both sides. Plow these grooves ¼ in. wide and ⅛ in. deep so that the top of the groove is about ¼ in. below the top edge of the bar. The grooves should be at least 8 in. long, which gives the movable jaw about a 4-in. lateral run after the headstock side plates are attached. Within reasonable limits, the dimensions of the grooves can vary, depending on the diameter of the pins that will ride in the grooves; but I wouldn't make them any deeper than ¼ in., nor any wider than 5/16 in.

The headstock—The headstock is just a small block of wood 1¼ in. thick by 1½ in. wide by 2½ in. long. Its job is critical, and you must take care to do precise work when making it. It's bored along its length to house the tightening screw for the movable jaw, and mortised across its width to capture the nut for the screw, which can be made from Allthread or from a ⅜-in. by 8-in. hex bolt, or square-head bolt. An ordinary ⅜-in. hex nut or square nut can be fitted into the mortise, but you will get greater thread length, and therefore less wear and longer life for the threads, by using threaded connectors. The connectors come in 2-in. lengths, and can be cut in half to yield two nuts. Acme (square) threaded rod and nuts can be used in place of Allthread.

Drill a ⅜-in. pilot hole through the length of the headstock to accommodate the screw. Accuracy in boring this hole is important, as any deviation from the true axis is going to be magnified when the screw is fully extended. Skewing can cause the movable jaw to bind on the bar. The hole must be centered in the thickness of the block and ⅝ in. above the bottom edge where it joins the bar. The ⅝-in. measurement is about right for gluing up panels and frames up to 1¼ in. thick, assuming that it's best for the screw to be centered in



the thickness of the stock being joined. For clamping thicker stock, you might want to make several clamps whose tightening screws are ¾ in. to 1 in. above the bar.

Next cut the mortise for the captured nut. It's easier to cut the mortise all the way through the block, making it square top and bottom and centered on the axis of the bore. It should be just wide enough for the nut to fit snugly, and tall enough to house the nut and prevent it from turning. If you use a threaded connector you can secure it in the mortise by filling around it with epoxy putty (but not at this point in the process). The mortise should be positioned somewhat forward of the middle of the headstock since clamping pressure will be exerted toward the rear, and more wood is needed there to support the nut or connector. Mortising complete, ream the hole using a 25/64-in. twist drill; this will keep the screw from dragging when you use the clamp.

Now glue the headstock to the bar. You can reinforce the joint with a couple of short ⅜-in. dowels if you want, but they are not really needed. Make sure that the sides of the headstock are flush with the sides of the bar. The side plates are now glued in place and will tie the headstock to the bar, strengthening the entire structure. When these are glued on, the nut is forever sealed up, so be certain to have the screw in place before gluing on these plates.

The movable jaw—First dimension a block 1½ in. square by 1 1/16 in. wide (1/16 in. wider than the bar, for clearance). Like the headstock block, the movable jaw is bored and mortised, but in this case the hole stops in the mortise. The mortise accommodates a pressure plate against which the screw bears as the clamp is tightened. Made from a piece of hacksawn and filed ⅛-in. thick steel strap, the pressure plate is counterbored slightly with a ½-in. twist drill. The lead end of the screw is rounded, either by filing or turning in a metal lathe, to nest neatly in the counterbore. Epoxy the pressure plate against the rear wall of the mortise.

A thin washer, slipped over the screw on the inside of the mortise and retained by a cotter pin, prevents the screw from backing out of the jaw on retraction. Having fitted the hardware, shave off the bottom of the jaw about 1/32 in. so it will be free to slide along the bar.

Make a pair of side plates 1½ in. wide by 2¼ in. long by ¼ in. thick and temporarily clamp them to the sides of the jaw so that they are flush at the top and overhang at the sides ¾ in. Now mark the centers for two bores on the bottom edge of each plate so that the holes will line up precisely with the grooves. Remove the plates, bore them, and glue them in place, inserting wax paper under the jaw to keep glue off the bar. The guide pins can be made from rivets or from carriage bolts sawn to the proper length and dressed lightly with a file for a sliding fit in the grooves; the jaws should not wobble. Fitting done, epoxy the guide pins in the holes.

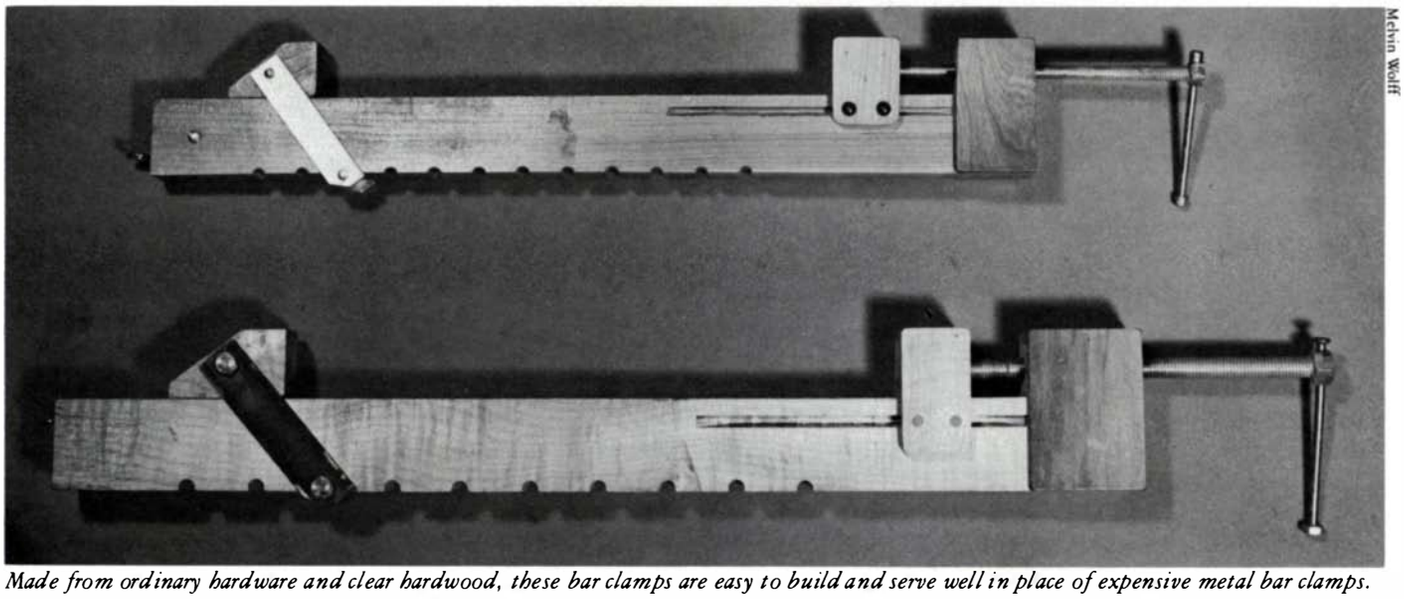
Provide for fitting a crank handle to the tail end of the screw by sweat-soldering a hex nut onto the threads, and drilling a hole through both the nut and the rod. You can make the handle from a 30d common nail or any other mild-steel bar stock. I turned the knobs on the ends of the handle from brass, but aluminum or wood would do as well. An acceptable alternative would be to thread the ends of the handle a few turns and screw a small hex nut on either end.

The rear jaw—This part can be made in any shape that suits the builder's eye, but it must be 1/16 in. wider than the bar. The two bridle pieces are made from ⅛-in. by ¾-in. steel or aluminum strap, and are riveted to the jaw at such an angle to allow it to be tilted forward and moved along the bar. If the angle of the bridle is too steep, you can't tilt the jaw, and if it's too shallow the metal straps will cut across the front face of the jaw and bite into the workpiece.

The rivets shown here are made from ¼-in. steel rod. To prevent the straps from marring the bar when I peened the rivets, I turned a small shoulder on the rods to hold the metal clear of the wood, and bored the holes in the bridle the size of this minor diameter. If you don't have access to a metal lathe, you can attach the bridle to the jaw with a stove bolt or carriage bolt. The bit (the rod engaged by the half-holes) can also be a carriage bolt.

A couple of coats of lacquer will finish the project, and keep glue squeeze-out from adhering to the jaws and bar. Besides saving money, these clamps are lighter than pipe clamps or metal bar clamps, and I find them handier to use. □

Tom Gerson is a retired accountant who makes furniture, taxidermy panels, and bootjacks in Stillwater, Minn.



Made from ordinary hardware and clear hardwood, these bar clamps are easy to build and serve well in place of expensive metal bar clamps.

On Making Chairs Comfortable

How to fit the seat to the sitter

by Alan Marks

Many contemporary chair designers seem more interested in innovation than in good seating. The imagination must be indulged, but should the end product please the eye at the expense of the body? Dr. Janet Travell, who was once therapist to President Kennedy (it was she who prescribed the rocking chair as back therapy) points out, "You wouldn't dream of buying shoes that don't fit you. But have you ever stopped to consider whether the chairs you sit in are right for you? One can go into most homes and not find a single chair that's properly designed to support the framework of the human body."

The industrial designer, in his eagerness to take advantage of new production techniques and materials, may mistakenly assume that human flesh and bones will conform to the same configurations as plastic and steel. Discomfort, however, is not always a deficiency. Thonet's most successful bentwood chair, employed by generations of avaricious Parisian cafe owners, is sufficiently uncomfortable that customers rarely dally after eating. But getting people back on their feet in a hurry is not what this article is about.

Ideally, a chair used by only one person ought to be custom-fitted, like a tailored suit or custom shoes, especially if the owner will be spending a lot of time in it. The fit of an office chair, for instance, can make the difference between productive workdays, and uneasy ones. Bad chairs create back problems. As there are few mass-produced chairs designed for very tall or very short people, and since even the most "average" person is still an individual, I custom-fit the chairs I design. I interview the client at home and take measurements from chairs he or she considers acceptable, often taking a width measure from one chair and a height from another and so on. I work in centimeters because they scale up easily *(FWW #31*, p. 56); the inch sizes given here are approximate.

The *Humanscale* seating guide, along with a number of other ergonometric guides worked out by Henry Dreyfuss Associates (MIT Press, 28 Carleton St., Cambridge, Mass. 02142, 1974, $37.50) provides a wealth of information for the designer. In it are worked out the critical angles and measurements for the entire range of chair types for men or women of average, large or small build. For each possible combination, a rotating dial gives optimum seat height, depth and angle, backrest height and angle, and armrest height. If you build custom-fitted chairs, this guide is a real time-saver, although individuals in each of the five given categories will still vary.

The seat—Begin designing your comfortable chair by considering the seat's height, width, depth, shape and the material to pad it. If this is a one-off chair to be used by more than one person, it is safer to use the measurements suitable for the average person. If you, like me, mistrust statistics, turn to the nearest suitable human reference—yourself, for example. I am about average height, and the distance from the floor to the underside of my bent leg is about 50 cm (19¾ in.). For the average person, then, the front edge of the seat has to be lower than this to avoid pressure on the sensitive arteries that feed the lower leg. If you are designing the average dining chair, choose a front edge height of 45 cm (17¾ in.).

Seat depth, the distance from the front edge to the back, is critical. If too deep, the sitter will be forced to slouch or else will suffer the discomfort of pressure on the back of the leg, which cuts off blood circulation and cramps tendons. If the depth is too shallow, discomfort may result from the decreased area over which body weight is distributed.

Most commercial sofas have a seat depth of between 53 cm and 56 cm (21 in. to 22 in.). According to *Humanscale*, however, depths greater than 43 cm (17 in.) will be uncomfortable for most small women and for at least half of all men. These people have to forgo back support, either sitting ramrod-like toward the front edge or sliding their pelvises forward and slouching. The sofa is therefore an in-between piece of furniture—not really comfortable for sitting nor well suited for lying down. The similarity between the words "couch" and "slouch" seems more than coincidence. For the average person, the distance between the rear of the bent lower leg and the plane of the lower back is 44 cm (17¼ in.). I generally subtract 2 cm to 4 cm (¾ in. to 1½ in.), for a seat depth that allows freedom of movement.

The seat of a dining chair should be wider at the front than at the rear, so the sitter's legs can spread. Good widths are 46 cm (18 in.) at the front and 36 cm (14¼ in.) at the rear.

A flat, hard seat is rarely comfortable for long sits. A contoured wooden seat, even if it faithfully reproduces the imprint of all the bones, muscles and curves of a resting derriere, is not comfortable either; the smallest shift in position causes misalignment. A seat must provide support over as wide an area as possible. A deep bucket seat such as found in sports cars does this well. It does not, however, permit the change in back position needed to relieve muscle strain. The most comfortable contour is the ever-changing one made by the sitter adjusting position on a cushioned surface. Only the most general sort of contour for the cushion underlayment is needed—at most a 20-mm (¾-in.) depression for the buttocks. A ridge in the middle of a seat is a real pain.

To counteract "foam pinch," caused by too much soft polyurethane (the deeper the sitter sinks, the more pressure is exerted on the sides of the thighs and buttocks), try laminating different densities of foam together. The portions of the chair bearing the most weight should have the highest density foam. The parts of the body most sensitive to pressure, such as the back of the knees and the bony portions of the upper back, should rest on softer material. I prefer to keep dining and office chairs as firm as possible, with perhaps an inch of high-density foam over a contoured plywood base. Most plas-

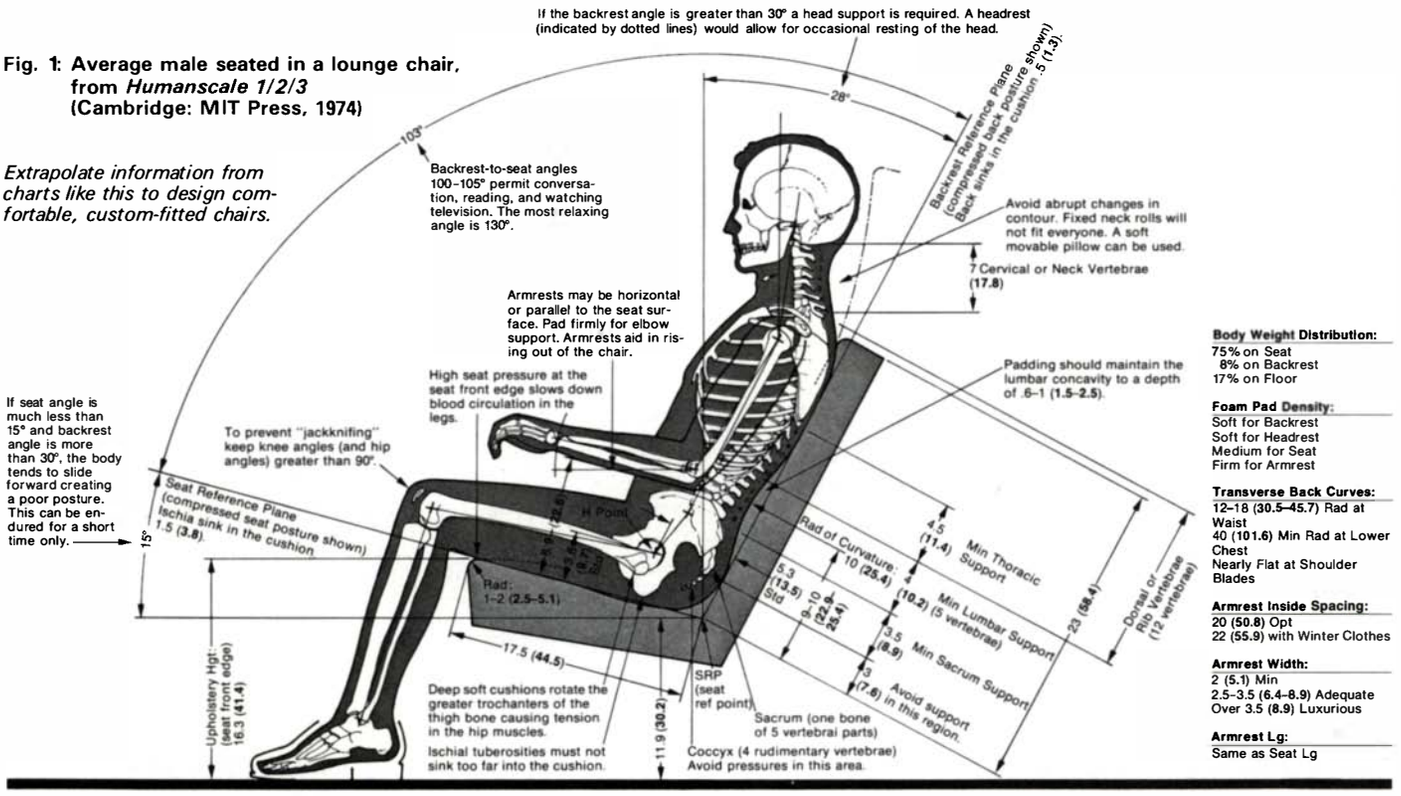


Fig. 1: Average male seated in a lounge chair, from *Humanscale 1/2/3* (Cambridge: MIT Press, 1974)

Extrapolate information from charts like this to design comfortable, custom-fitted chairs.

tic foams can be readily cut with a bandsaw, and can be laminated using contact cement either brushed or sprayed on.

You might want to try a relatively new type of foam patented and manufactured by Kees-Goebel, 4954 Provident Dr., Cincinnati, Ohio 45246. Called Temper Foam, it is both viscous and elastic, almost like a marshmallow. Body heat softens it so that it conforms to the sitter's shape, distributing body weight evenly over the entire contact area. After use, it slowly regains its original shape.

At the bottom of the pelvic girdle two knobs of bone jut out. You can feel the pressure these two knobs exert if you sit on your hands. They're about 13 cm (5 in.) apart and 13 cm (5 in.) from the plane of the back. If these bones bottom out in sitting, most of the body weight is supported by two tiny areas barely 6 mm (¼ in.) square each. This hurts. A two-layered cushion—high density foam on the bottom, medium density on top—is one way to deal with this problem. Another way is to add webbing at critical points covered by a single layer of foam. With a circle cutter set to a 12-cm (4¾-in.) diameter cut two holes in the flat plywood seat, centered 13 cm (5 in.) from the rear edge and 6.5 cm (2½ in.) on either side of the centerline. Round the edges with a rounding-over bit to prevent chafing of the webbing, which should be tacked in Xs over the holes. Using this technique, as little as ½ in. of the proper foam padding makes the seat quite comfortable.

Nylon-reinforced rubber webbing, such as available from Constantine, 2050 Eastchester Rd., Bronx, N.Y. 10461, has replaced the traditional jute variety. Besides being strong and durable, it is elastic. I have used it in both sofa and easy-chair construction. You can tack it to wooden seats, or use special metal clips that fit into routed grooves, making installation quick and eventual replacement easy.

A cheap alternative to rubber webbing, which apparently possesses all its strength and springiness, consists of longitudinal latex cords wrapped and tied with synthetic threads and covered with a thin bonding layer of latex. Because this webbing comes in several strengths, various grades can be combined to achieve the chair support needed for maximum comfort. In attaching it, the material is stretched to twice its original length, so the frame must be sturdy enough to withstand this constant tension. It can be obtained from Sanglatex USA, Inc., PO Box 269, 921 Baker Road, High Point, N.C. 27261, and from Mateba Webbing, 715 Pine St., Dunville, Ontario N1A 2M4.

The back—Again, to design a comfortable chairback, we must consider some basic human anatomy. The spinal column consists of 24 vertebrae that form a reverse curve. The lower five, the lumbar vertebrae, comprise the concave curve of the small of the back. They attach to the sacrum, the broad triangular bony structure of the pelvis. The twelve segments above the lumbar are the thoracic or dorsal vertebrae, forming the convex dorsal curve. Above them come the seven cervical vertebrae of the neck, a concern in specialized seating. In addition to the curve along the length of the spine, there is the curve across the width of the back made by the rib cage, shoulders and waist. Any comfortable chair must consider this curve too.

The spine has two functions that concern us here. It supports the body and it enables the body to twist and bend. Because the weight it carries continually shifts during normal motion, it must flex in all directions. This flex is permitted by tough yet elastic ligaments which fasten the vertebrae to one another. The entire spine is balanced and held in position by pairs of muscles in the back, abdomen and hips. If a muscle contracts to a new position, its complementary muscle must relax enough to allow it to do so. To hold the body in any one position against the force of gravity, both muscles tense. Thus even when the body seems at rest, muscles can become fatigued if body weight is not supported by the chairback.

The two sources of back discomfort are stretched ligaments and fatigued muscles. The ligaments that can cause the most pain when stretched are the two that run front and back the

Fig. 2: Plotting a typical comfort-curve

Plot a comfort-curve for an easy-chair back from four points on two parallel lines at an angle of 100° to the seat plane. Point a is the juncture between the seat and the chairback, point b is the reversal point between the lumbar curve and the dorsal curve, point c is the reversal point of the dorsal curve, and point d is the end of the dorsal curve. The measurements shown are for an average-size male. Custom-designed chairs require the individual's actual measurements.

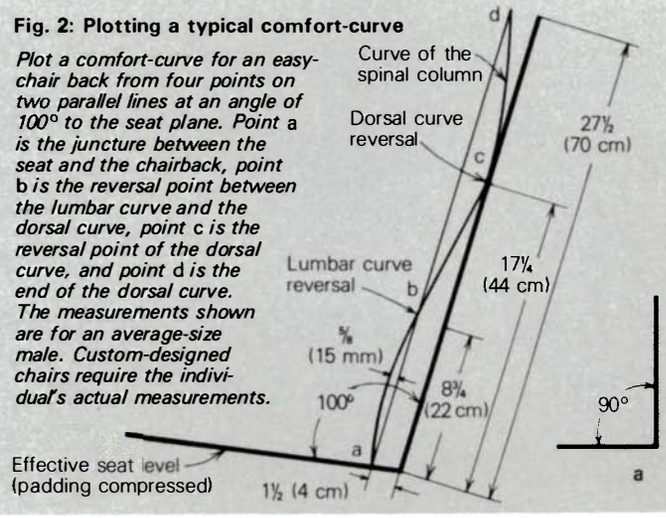


Fig. 3: Metamorphosis of chair types

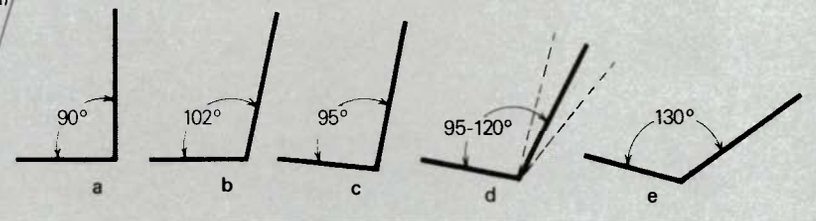
a. *Begin with seat parallel to floor, and back perpendicular to seat, as in some dining chairs.*

b. *Tilt the back until sitter begins to slide forward.*

c. *Tilt the back and seat as a unit, and lower it to produce executive chair.*

d. *Lower chair and increase angle to produce easy chair.*

e. *Continue to tilt the back to produce lounge chair.*



entire length of the spine: the anterior and posterior longitudinal ligaments. Too much curve at the small of the back, too small an angle where the back meets the seat, or sitting upright in too low a chair can deform the spinal curve, stretching the anterior ligament. Too little support will allow the spine to bow, stretching the posterior ligament. A comfortable chairback must be designed to keep these two ligaments free of tension.

The other cause of discomfort, muscle fatigue, can be alleviated in one of two ways. You can try to relieve weight from the lumbar region by increasing the angle between the chairback and the seat, and providing a suitably cupped cavity for supporting the upper body. The farther a chairback reclines, the less weight the muscles have to balance and the more important the cushioning of this cavity becomes. The second way to deal with fatigue is to allow for movement rather than locking the muscles into a single, tiring position. Back muscles should constantly change their state of tension, as in walking. The most comfortable stool I ever designed was one whose legs and seat flexed to permit twisting and swaying. Avoid deep lateral curves in straight, upright chairbacks; they cause fatigue by inhibiting sideways body movement.

I use four reference points to plot the basic comfortable curve for the back of an easy chair: the juncture between the seat and the chairback (point *a* in figure 2), the reversal point between the lumbar curve and the dorsal curve (*b*), the reversal point of the dorsal curve *(c)*, and the end of the dorsal curve *(d)*. Draw a straight line between points *b* and *c*, and a concave curve from points *c* to *d*. The convex curve drawn from points *a* to *b* not only provides lumbar support, it creates a slight pocket for the buttocks to expand into. A comfortable chair does not crowd the sitter here. If the chair seat is padded, measurements must be taken with the padding compressed, as it will be in use. This is the effective seat level.

Little weight rests on the chairback except in the most laid-back chairs. Cushioning for the lower back should be generally firm; for the upper back, soft. The lateral curve can be achieved with curved back rungs or shaped upholstery.

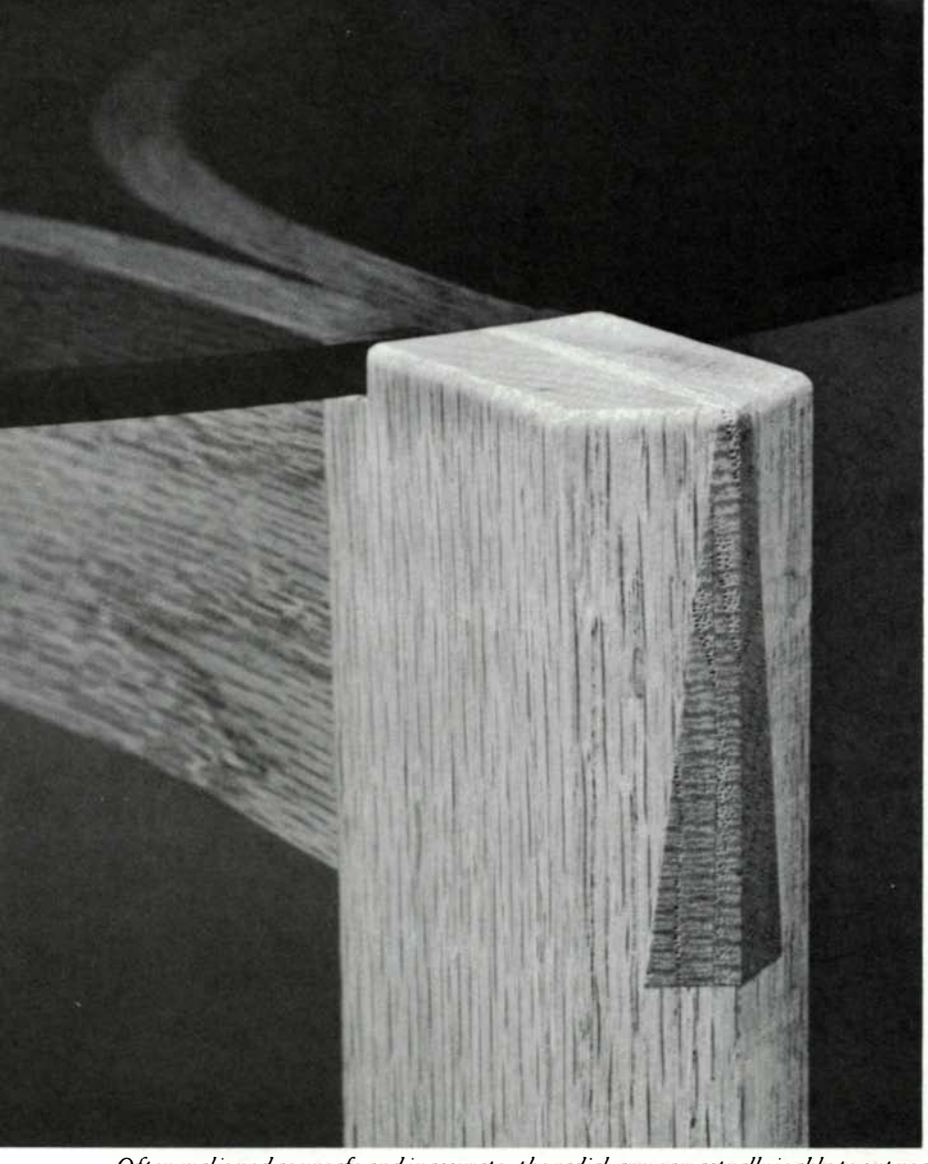
The armrests—We have all sat in chairs with armrests so high that shoulder muscles are tensed. Armrests that are too low feel awkward, encouraging the sitter to slouch. Ideally, armrests should take half the weight of the arms, while the remaining half is taken by the shoulders. The average adult requires an armrest 22 cm (8¾ in.) above effective seat height. The distance between arms should be at least 49 cm (19¼ in.). Large people will need more width.

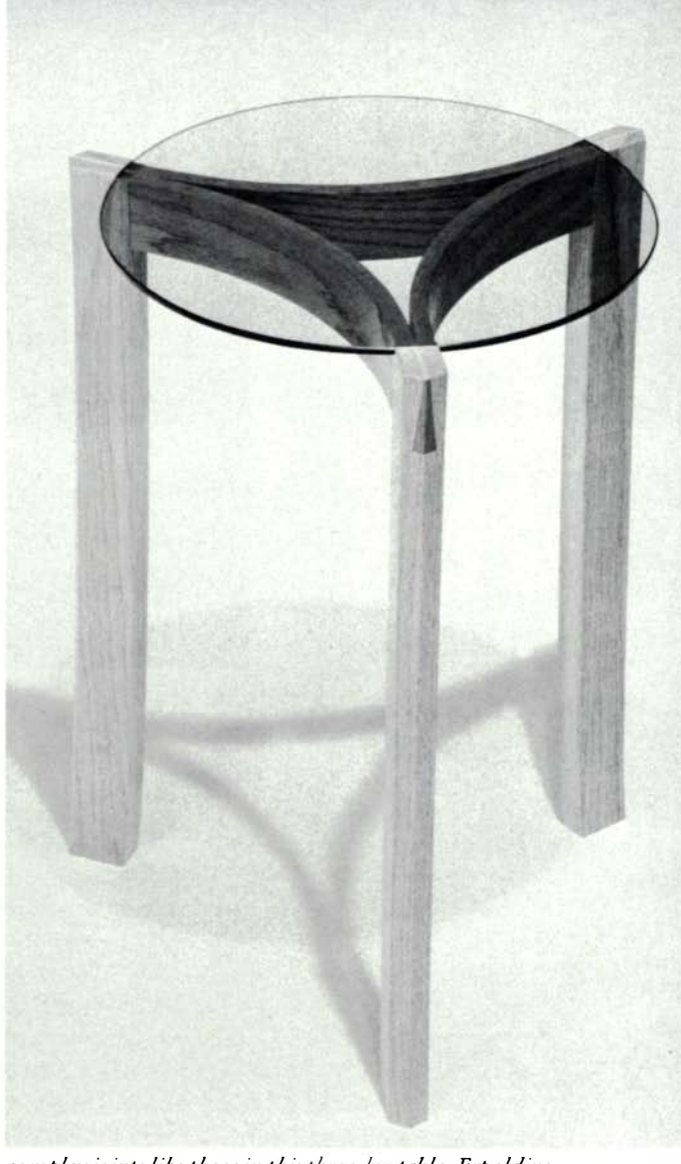
The seat/back angle—To understand the variations possible for the angle between seat and back, consider the metamorphosis of an imaginary chair through the range of chair types, from dining chairs through executive and easy chairs, ending with the lounge chair (figure 3). The basic comfort-curve built into the back remains constant throughout, though neck and head support must be progressively added as the sitter's weight shifts back. The three factors that do change are the angle between the comfort-curved back and the seat, the angle between the seat and the floor, and the height of the seat from the floor.

In the dining chair, the seat is parallel to the floor and the back is vertical (a). If you now, in imagination, hinge the back where it attaches to the seat and slowly tilt it (b), you reach a point at which the sitter begins to slide forward—about 102°. To prevent this, the entire chair must tilt as a unit (c), while maintaining a seat/back angle of 95° or less, which is a good, standard angle. This, however, raises the front edge and creates uncomfortable pressure at the back of the knee. To relieve this pressure, we lower the chair toward the floor (executive chair). Continuing to tilt and lower the chair reclines the body enough for the seat/back angle to be increased again (d), since a forward slide has been forestalled (easy chair). Any further recline is now accomplished by increasing the pitch of the back (e). Metamorphosis complete, we end up with a lounge chair.

Pat measurements such as from *Humanscale* can lead to a good chair, but there's more to it. I remember a fellow student asking Carl Malmsten how he knew that a chair he'd drawn would be right. Malmsten looked askance at the youth and retorted that he had been designing chairs for fifty years, that was how he knew. Designing a comfortable chairback has much to do with experience and a lot to do with instinct. Given comfort as a criterion, there still remain endless possibilities for expressing individuality and originality. A designer should welcome at least some limitations. They are rather like the weights a diver uses to explore the ocean floor. □

Alan Marks wrote on how to develop ideas for chair design into working drawings in FWW *#31, Nov. '81.*





Often maligned as unsafe and inaccurate, the radial-arm saw actually is able to cut neat, complex joints like those in this three-leg table. Erpelding cut the dovetail mortises in the legs as shown on page 74. The tenons on the triangular stretcher assembly, composed of bent laminations, were scribed from the mortises, then cut with a back saw—an efficient interplay of hand and power tools. Photos: Steve Young.

Slip Joints on the Radial-Arm Saw

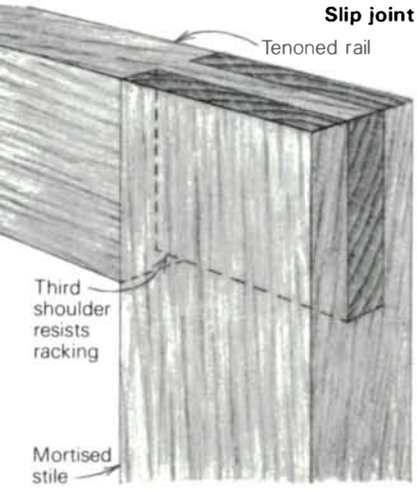
Getting accurate results from a versatile machine

by Curtis Erpelding

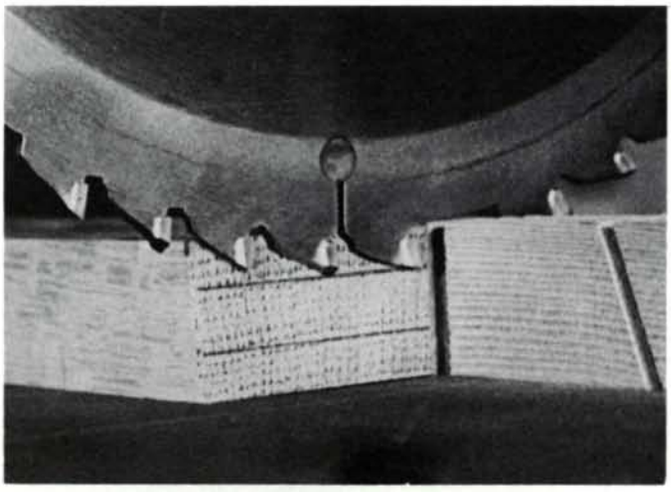
Most discussions of power-tool joinery focus on the table saw, the router and the bandsaw, and neglect the radial-arm saw. Many insist that the radial-arm saw is inherently dangerous, and impossible to adjust accurately. I find neither argument convincing. Caution and common sense go a long way in reducing potential hazard, and the saw's ability to do precise work is almost completely in the control of the operator. My saw is a mid-60s vintage 10-in. Sears Craftsman. The guides for the rollers are worn and pitted, the indexing pins less than tight, and the arbor has a slight amount of run-out. Nevertheless, I've been using this saw for five years to cut close-fitting joints, and would hesitate to replace it with a new industrial model. As a good marksman knows how to deal with the idiosyncracies of his rifle to group his shots, so the canny woodworker knows how to compensate for slop and play in his radial-arm saw.

In making slip joints, the radial-arm saw offers several advantages over the table saw. First, the workpiece remains fixed during the cut, and because there is less slop in an old radial-arm saw than in most new tenoning jigs (homemade or otherwise), the cuts are more precise and easier to control. Second, the column-raising mechanism on the radial-arm saw lets you make very fine depth-of-cut adjustments for paring a joint to final fit. You'd have a hard time adjusting the fence on a table saw in such small increments to make the same cuts. Finally, the radial-arm saw imposes no real limits on the length of the pieces being joined, as long as the ends are supported. With the table saw, cutting joints on members more than 4 ft. long involves a precarious balancing act, which will adversely affect the accuracy of the joint, particularly if the free end runs afoul of a ceiling joist or light fixture in a shop with a low ceiling.

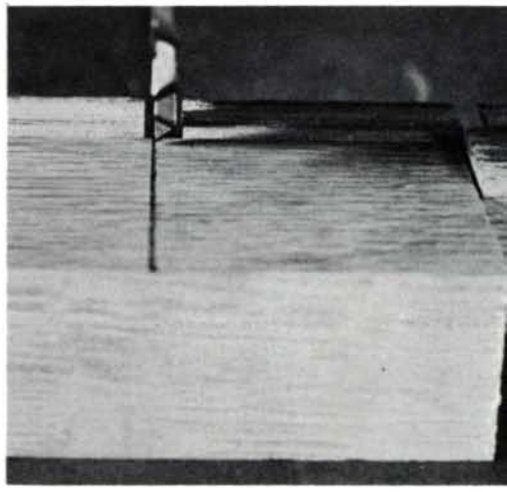
Cutting a slip-joint mortise and tenon on the radial saw requires, as in hand work, careful marking out. But you need to mark out only one joint, which becomes the reference from which the saw is set to cut the others. After the members are



A



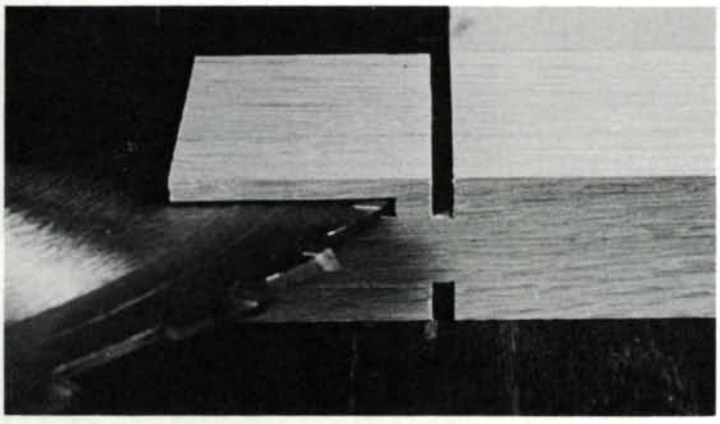
B



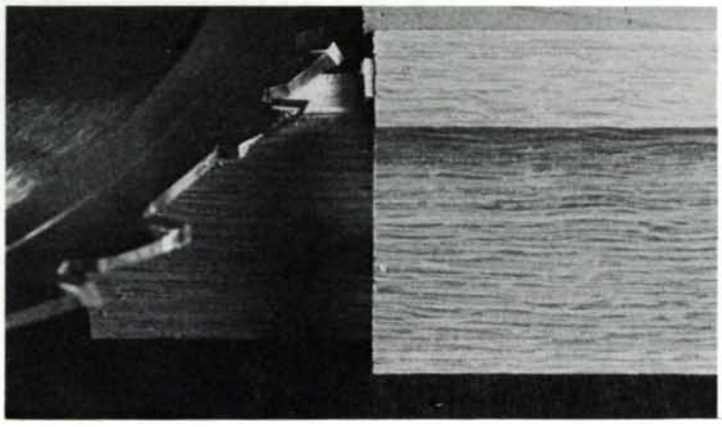
C

Cutting slip-joint tenons on the radial-arm saw begins by properly setting the blade to cut the shoulder line. Set the depth of cut by aligning the blade with the marking-gauge line that delineates the tenon thickness on the end grain (A). *Then align a tooth that has outside set with the shoulder line* (B). *Sawing the cheeks requires rotating the blade to its horizontal position and positioning the stock using a 7-in. high substitute fence, a spacer and an auxiliary table* (C). *For safety, make several passes, advancing the work into the path of the blade between passes. The waste piece is left attached and broken off by hand before the cut is completed* (D).

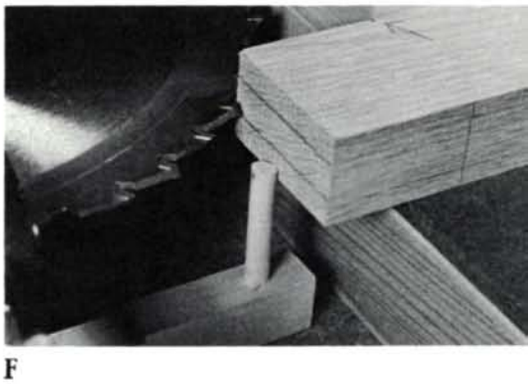
D



E



To complete the tenon, a third shoulder (E) *adds, resistance to racking and hides imperfections in the mortise. Author cuts mortise for slip-joint with saw in horizontal position, using substitute fence, spacer, and auxiliary table, as in cutting tenon cheeks. A dowel in a thin piece of wood* (F) *stops the workpiece to control the depth of the mortise.*



F

Photos, except where noted: John Switten

thicknessed and cut to length, they are positioned in what will be their final orientation. The triangle marking method (*FWW* #11, pp. 50-53) is a way to avoid confusion.

The tenons—The tenoned members (rails) are marked first. For the shoulder lines, set the cutting gauge (see p. 82) to the width of the mortised member and score the lines on both faces and on the inside edge as well. With a marking gauge, mark out the tenon thickness on the end grain, letting the gauge ride against one cheek and then the other. This ensures a perfectly centered joint. Where the tenon must be offset, use a mortise gauge and set the two points to the thickness of the tenon, then set the fence the appropriate distance from the face side. When the rail has been marked for the shoulders and for the tenon thickness, take a sharp pencil and make the lines more visible.

Cut the shoulders to the appropriate depth first. Set the height of the saw so that the teeth just touch the top mark on the end of the piece (photo **A**). Then line up the piece so that a tooth with outside set just touches the inside of the shoulder line (**B**). Clamp a block on the fence to hold this setting. Cut the shoulders, first one side and then, by flipping the piece over, the other.

Of all the operations, cutting the shoulders square requires the most accuracy on the part of the saw. And adjusting it to cut consistently square to the fence seems to be the major bugbear concerning the tool. If you simply can't get your machine to cut square, don't despair. Cut 1/32 in. shy of the shoulder, and then trim to the line with a rabbet plane.

But before you decide that your saw won't cut square, make all the usual initial adjustments to align it, and then practice pulling the blade into a piece of scrap that's been scored a number of times at 90° to the fence. Vary the way you pull the saw carriage over the work, observing the results of each cut. Because the blade will respond to very slight lateral pressure on the carriage handle, it could be your operating habits that keep the tool from cutting square consistently. Once you find the proper stance, the arm and the shoulder movements that make for repeated square cuts, practice until you can get it right every time.

To cut the cheeks of the tenon, turn the saw to its horizontal position. Remove the regular fence and replace it with a 7-in. high auxiliary fence on the right-hand side of the blade. This is adjusted square to the table, and so that the sawblade just touches its edge. An auxiliary table is necessary to elevate the workpiece. I use a piece from an old solid-core door; it remains reasonably stable throughout seasonal changes. Finally, clamp a block of 8/4 maple to the fence as a spacer so that its edge just touches the blade when the saw is pulled through (C). The spacer prevents the blade from contacting the workpiece when the saw is fully retracted.

Set the blade about 1/32 in. above the mark for the tenon. Advance the workpiece about an inch at a time, and pull the saw through. Don't try to make the whole cut in one pass or try to feed the workpiece into the saw as it cuts, or you'll overload the motor and risk a dangerous kickback. Also, don't complete the cut at this point, but leave the waste slightly attached (**D**). Remove the workpiece and break the waste off by hand. Then make the final pass, setting the shoulder line even with the edge of the maple spacer block.

Using even a 40-tooth carbide-tipped blade, cutting into tough end grain causes the blade to vibrate and leaves a cut that's less than clean and accurate. So cut all the tenons first to this 1/32-in. margin; then trim them later with a final light cut to the gauge line, which you can make in a single pass. In operation, hold the workpiece firmly with your right hand at a safe distance from the blade. When guiding the saw carriage into the cut, keep your elbow stiff and pull by pivoting your upper body rather than by bending your arm. This helps keep the saw from self-feeding and stalling.

Though not a common practice in making slot mortises, cutting a third shoulder on the underside of the tenoned member will add strength to the joint, making it more resistant to racking. Also, the third shoulder will hide any imperfection on the inside bottom of the mortise. All that's involved is taking a slice off the bottom edge of each tenon (E). Set the saw to cut 1/8 in. into the tenon. Set the shoulder slightly behind the edge of the spacer block so the blade cuts just shy of the line, then chisel the remaining end grain flush with the shoulder.

The mortise—The next step is cutting the mortise. When both pieces are the same thickness, the width of the mortise can be marked out with the marking gauge at the same setting used for the tenon. The depth of the mortise is gauged from the width of the tenon and a line is scored on each edge with a knife. Continue the line across the inside and outside edges and make a slight notch with a knife on the corner edge. This notch, when lined up with the edge of the spacer block, determines the depth of cut. A long, thin piece of wood with a dowel sticking vertically out of it is clamped to the tabletop as a depth stop. With the workpiece resting against the upright dowel, there is clearance for the saw to pass (**F**). Set the stop so that the saw cuts just shy of the gauge line.

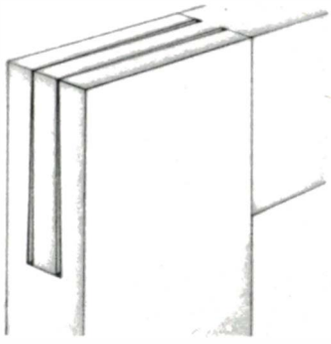
Lower the saw to cut 1/32 in. above the bottom line of the mortise layout. As in cutting the tenon, advance the workpiece only an inch or less with each pull of the saw. Make the final cut with the workpiece registered against the dowel of the stop block. Flip the piece over and repeat the process. On small pieces with narrow mortises, you can clean out the waste with the saw, but on larger members I cut the waste out with a coping saw, after which I clean up the bottom of the mortise by chiseling to the gauged line.

Return the piece to the saw and lower the blade so that it cuts just to the bottom line marked on the end grain. Lowering the blade in tiny increments after each set of cuts will widen each mortise until the respective tenon will snugly slip through. Note the word "respective." The triangular marking system pays off here by eliminating a great deal of confusion (and probable error) by showing which mortise belongs to which tenon.

Theoretically, the final saw setting should produce mortises of identical width in each member, and each tenon should fit with the same snugness. Theoretically. In practice I've found that it's better to make the necessary adjustments to fit each joint separately. It takes only a little longer, and inspires more confidence in the strength of the finished assembly. A tenon offset with respect to its mortise or vice versa will not allow you to flip the piece over to make the second cut at the same saw setting. Rather, after cutting one kerf in each piece, you have to pause to make a new saw setting. Fine-tuning this second cut widens the mortise to fit its tenon.

At this point a skeptical reader might wonder how, if you can't expect the saw to cut precisely square to the fence, can

you ever expect it to cut truly horizontally (in line with the workpiece)? Well, you can't. You just try to take advantage of this. Indeed, whenever I confront a situation where I doubt achieving the required accuracy, I try to determine on which side of perfect it behooves me to err, in order to obtain the best results. In this case, a snug joint and a frame that won't twist or wind will result if certain parts of the joint have a little looseness and other parts are correspondingly tight. Because there is some play in the horizontal indexing pin on my saw, I can manipulate the angle of error. By pushing up on the left side of the blade and then tightening the locking knob, I can minutely incline the blade. This will produce a tenon that will narrow ever so slightly from front to back, and a mortise that will widen ever so slightly from top to bottom. These "errors" make for a joint that looks, in a much exaggerated view, like that shown in the drawing at right. In actuality, the amount of deviation from horizontal amounts to less than half a degree (1/64 in. end to end), and the corner of the joint is tight and snug.



Before gluing up I always plane the rails clean on both sides. This removes the triangle markings, which you still need, so transfer them to the outside edges or lightly re-mark them immediately after planing. Also plane all inside edges on both rails and stiles. Apply the glue to both the mortise and the tenon, assemble the frame and draw it up first one direction and then the other with a bar clamp. If the shoulders were cut square and the bottom of the mortise pared true, and if the outside corner edge of the joint is tight, there is no need to leave the frame clamped up, especially since clamps can throw the frame out-of-square or in winding. Having checked for squareness (*FWW* #31, Nov.'81, p.89), clamp the cheeks of each mortise with two C-clamps, one at each "loose" area. Use pads to protect the work. When the glue is dry, plane the stiles flush with the rails.

The dovetail slip joint—Shown at the top of the facing page, this joint is well suited to being made on the radial-arm saw. The first step is to make a cradlelike fixture to hold the rail (tenoned member) at the proper inclination for cutting the tenon cheeks and shoulders. As shown in figure 3, the fixture is made from two pieces of 3/4-in. plywood and a couple of stretchers. The angle of inclination shown at *a* is the slope of the dovetail. This angle will vary, of course, depending on the dimensions and proportions of the stock. Two members joined with their edges in the same plane (figure 1) will not require as steep a slope as two members joined with their faces in the same plane (figure 2). A slope of 10° from the vertical will do in the former case, while a slope of 3° to 5° seems appropriate for the latter.

Marking out the pieces proceeds in basically the same manner as with the slip joint. Start with the rail and mark the shoulder lines.

The dovetail tenon—With a sliding bevel and a scriber, mark out the dovetail tenon, making it no less than 3/16 in. thick at the top edge. The sawblade will normally remove at least this much from the narrow part of the mortise. Also remember that at the widest part of the mortise the cheeks are the narrowest, so leave enough wood here for a strong joint, something to consider when laying out the tenon. As a last step, witness-mark the outside edges of all the members.

Now place the fixture on the saw table, its high side against the fence on the left side of the blade. Place a rail, outside edge out (facing you), in the crotch of the fixture, and set the saw to the proper depth for cutting the shoulders (**G**). Clamp a stop block to the table for repeated cuts (**H**). To cut the opposite shoulders on the rails, you must reverse the fixture, placing the low side against the fence. Because in this position there is no back stop to hold the rail, you have to nail a strip behind the workpiece or devise some other means of holding it firmly in place. Don't try to make this cut without securing the work, or the blade will snatch the piece from your grasp and send it flying.

When you have cut all the shoulders for the tenons, tilt the saw to its horizontal position, and arrange the fence, spacer and auxiliary table in the same manner as for the slip joint. Set the fixture's high side against the fence, and place the workpiece face edge out in the crotch (I). Adjust the blade 1/32 in. above the top line scribed on the end grain for the tenon, and cut the tenon on one side; again advance the workpiece an inch or so at a time between passes, and stop the cut 1/4 in. shy of the shoulder. Break the waste piece off by hand and complete the cut. Cut the other side by reversing the jig and flipping the rail (**J**), taking the same cautions as before to secure the workpiece. Now, lower the blade 1/32 in. to the gauge line and trim the tenons to final thickness. To cut the shoulder at the bottom of the tenon, reset the saw and hold the piece directly on the auxiliary table.

The dovetail mortise—Gauge the depth of the mortise from the width of the tenon, and continue the mark across the entire edge of the stile (or leg). Notch the corner edge to determine the blade setting for the depth of the mortise. Lay out the shape of the pin on the face edge and continue the lines across the end-grain surface.

Set the sawblade now at the correct angle, using the sliding bevel (**K**). Unplug the saw before removing the guard; then replace the guard after making the setting. As in cutting the slip joint, you can tension the dovetail mortise and tenon by inclining the blade slightly, so that the tenons will narrow from front to back and the mortises widen from top to bottom. To get the correct setting—a fraction of a degree over the angle of the fixture—some trial and error is required. Use a test piece.

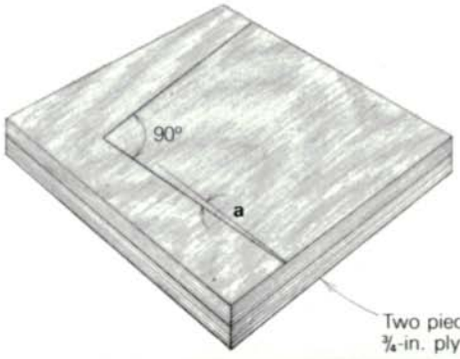
After fine-tuning the tilt angle, you must readjust the fence and maple spacer so that the teeth of the blade will just touch their edges. Line up the notch on the corner edge of the stile with the edge of the maple spacer, and clamp the stop block to the table. Adjust the blade to cut just above the bottom line marked on the end grain of the piece. Because the blade is set at an angle, you cannot cut the piece in increments, but must make the entire cut in one pass. This means that the blade will want to push the piece away, and so you must pull the saw into the cut very gradually, and with the utmost caution. When you have established kerfs on both sides (L), a coping saw removes the waste, and a chisel cleans the bottom of the mortise. Trim the mortise by lowering the saw in small amounts until the respective tenon slips snugly

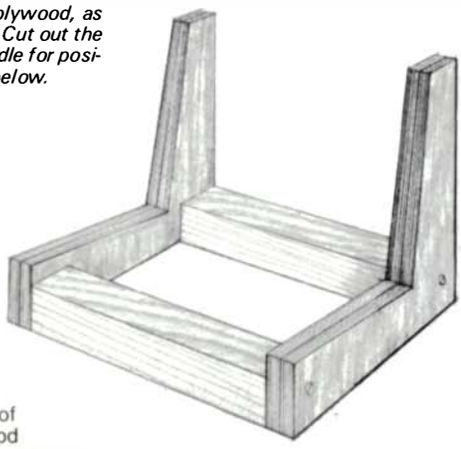
Fig. 1: Dovetail slip joint, edges in plane

Fig. 2: Dovetail slip joint, faces in plane

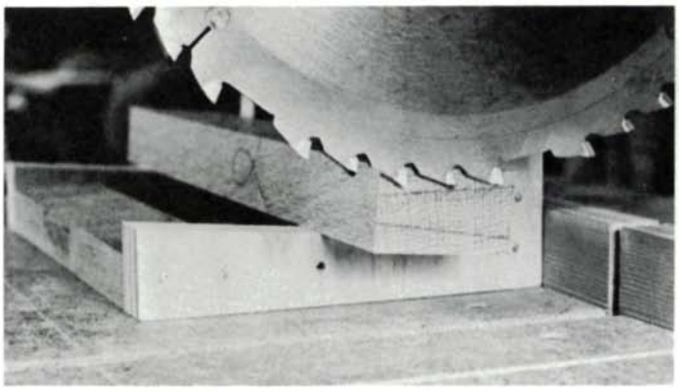
Fig. 3: Jig for dovetail-slip-joint tenons

To make jig, lay out a right angle on two pieces of plywood, as shown. Angle **a** *is the slope of the desired dovetail. Cut out the supports and screw them to spacers to create a cradle for positioning the tenon stock, as shown in the photos below.*

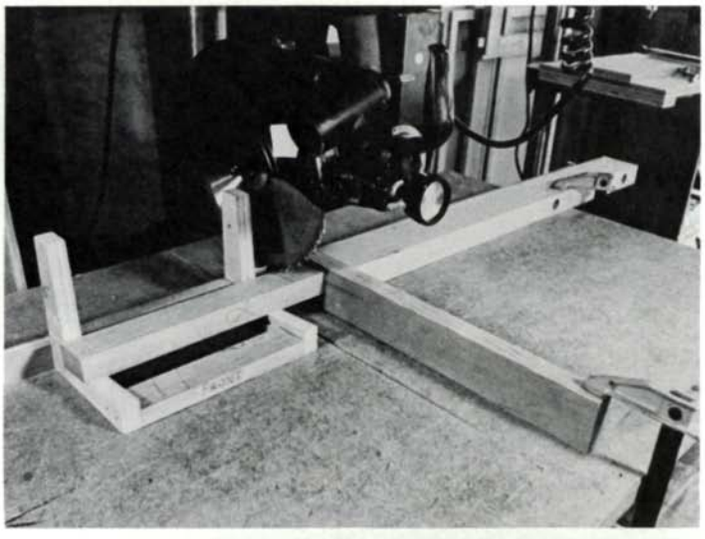




G

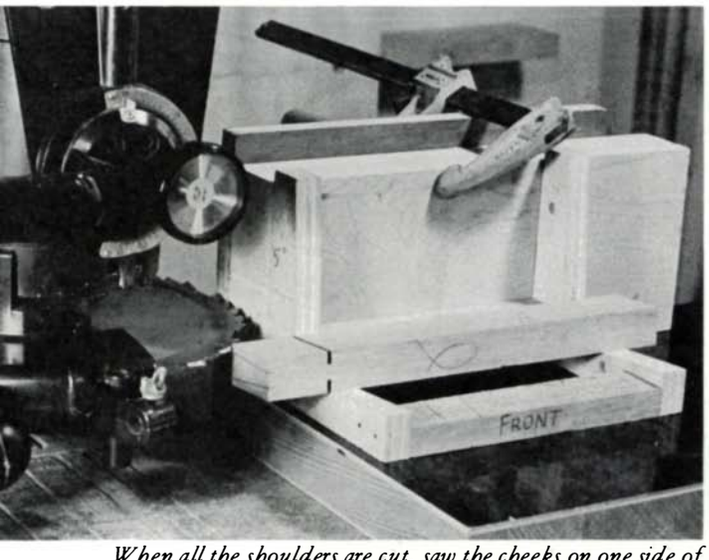


H

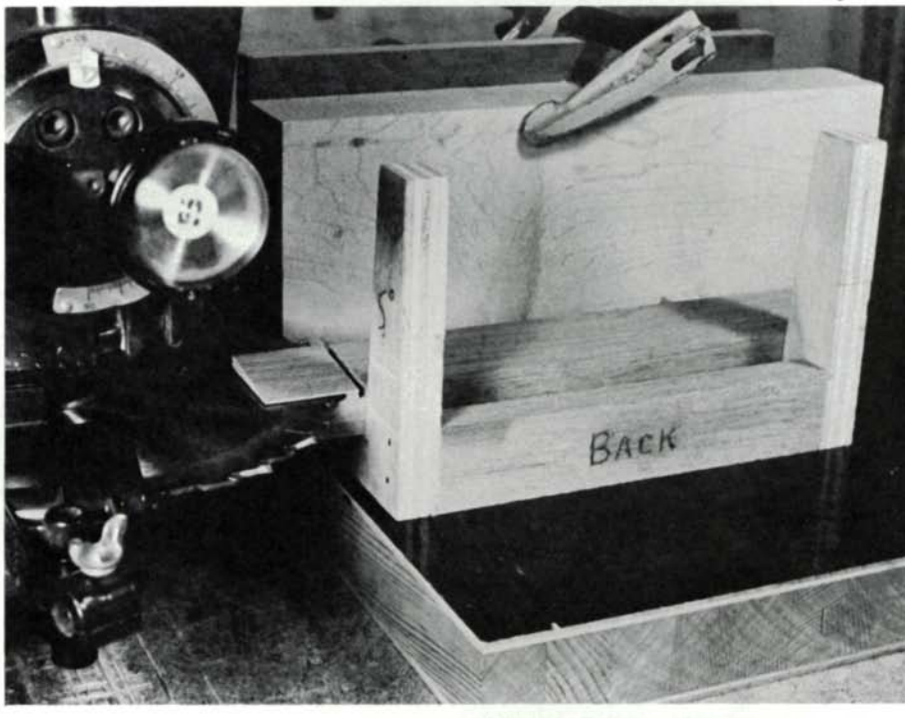


To cut the tenon for a dovetail slip joint, author uses a cradlelike fixture, the construction for which is shown in figure 3, above. Place the scribed stock in the fixture and set the depth of cut for the shoulder (G). *Then clamp a stop block to the saw table and cut the shoulders for one side of all your stock* (H). *To cut the shoulders on the other side, reverse the cradle so its low side is against the fence.*

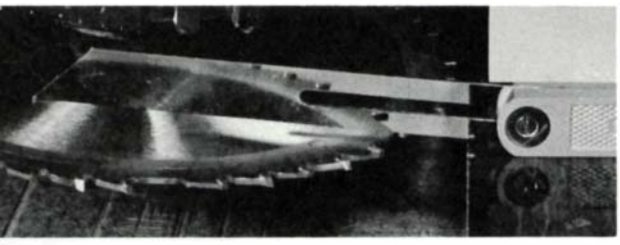
I



J

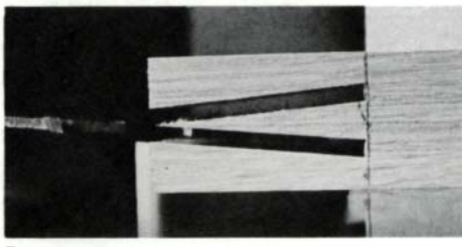


When all the shoulders are cut, saw the cheeks on one side of each piece (I): *tilt the saw to its horizontal position, set the fixture's high side against the fence and adjust the blade just above the scribed line on the end grain. To saw the cheeks on the other side, reverse the jig and flip the workpiece* (J). *Saw in a series of passes, advancing the workpiece between passes and breaking off the waste before completing the cut.*



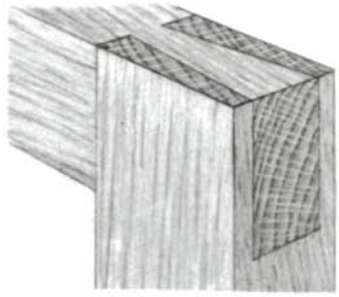
K

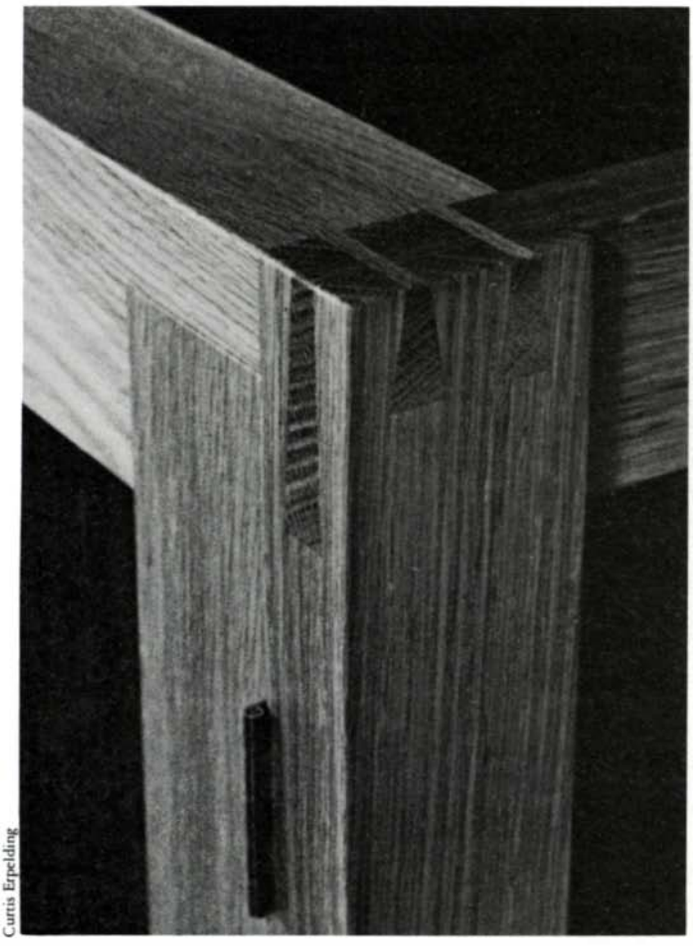
To saw the mortise for the dovetail slip-joint, the stock is positioned horizontally, and a sliding bevel is used to set the sawblade at the correct slope (K). *Because the blade is tilted, the mortise cheeks must be sawn to full depth in one pass, necessitating extreme caution, lest the blade throw the work. The substitute fence, spacer and auxiliary table, used for cutting the simple slip joint, are used for this operation too. Flip the board to saw the other cheeks* (L), *then remove the waste with a coping saw and chisel.*



L

Variations on the slip-joint that the radial-arm saw can make include the dovetail slip-joint with two half-pins and a full tail (right) rather than with two half-tails and a pin, as described in the previous pages. Below is a dovetail three-way case joint for the four top corners of a frame-and-panel cabinet. The double dovetail pins on the front horizontal member are cut by hand.





Curtis Erpelding

in. If you have made correct settings, the joint will be tighter at the top corner than at the bottom. This tension actually forces the tenon into the mortise.

Other joints—In addition to the two joints described here, other variations are possible, either using part of the method or adapting it to different requirements. Instead of joining two members with a dovetail pin (tenon) and two half-tails, you could use the same fixture to cut a joint that consists of a full tail (tenon) on one member and two half-pins on the other, as shown in the drawing at left. In some situations such a joint might be structurally or visually preferable.

Sometimes it's not possible or even desirable to cut the entire joint on the saw, as was the case with the curved-stretcher table shown in the photos on p. 71. Because the stretchers (rails) are curved, and glued together in a triangular fashion before the tenons are cut, I couldn't hold them on the saw table, certainly not in the fixture. I cut the mortises in the legs using the radial-arm saw, marked out the tenons from the mortises, clamped the stretcher assembly in my vise and cut the tenons with a backsaw.

I used a dovetail three-way case joint (photo, left) for the four top corners of a frame-and-panel cabinet. First I cut the dovetail slip joint in the regular way and then cut the two sockets in the mortised members, all on the radial-arm saw. From the two sockets I laid out the two dovetail pins on the third member, and cut these by hand. Next, I glued up the slip-joined members and cut the tenon flush with the socket walls to receive the pins.

The angled fixture pointed the way to an even more specialized joint—a knockdown, through-mortise-and-wedge joint, which I used to connect the stretchers to the legs in my "Orientable" (*FWW* #20, Jan.'81, p. 59). The fixture held the stretcher at the proper angle while the tilted saw cut a tapering dovetail mortise. A compound tapered wedge draws the stretcher tight against the crossmember of the legs. I later applied the same joint to a knockdown shelving unit. □

Curtis Erpelding makes furniture in Seattle, Wash.

On exposed joinery

Architect Louis Kahn once said that the joint is the beginning of ornament. He was talking about architecture of course, but the same can be said also about cabinetry and furniture. Until the Arts and Crafts Movement in England (*FWW* #26, Jan. '81, p. 54) the history of furniture design had been a history of hiding the joint. There are some notable exceptions to this generality. The American Shakers, whose religious scruples proscribed ornament, relied on visible joinery to give their simple designs character and presence. English country craftsmen, who inspired Ernest Gimson and others in the Arts and Crafts Movement, cared chiefly about the practical utility of their furniture, and had no reason to conceal its structural integrity beneath floral decoration and classical moldings. After Gimson and the Barnsleys, exposed joinery became, for better or worse, a design principle. Through wedged tenons and through dovetails attest both to the skill of the craftsman (if it's going to show, it had better be sweet) and to the honesty of the design.

The modern craftsman has the advantage of using power tools which greatly facilitate the speed and accuracy with which open joints can be made. And these tools do this, I think, without sacrificing any measure of handmade quality. Exposed joinery can be the signature of a craftsman or shop, an important design detail, and a record of the piece's manufacture. Industry cannot economically use exposed joinery as a design element to any great extent. The few examples—machine-cut dovetails and finger joints in chair frames—usually lack the crispness, the clarity, and the careful proportioning that the individual craftsman can bring to a piece. When the joint fits really tight, when no gap shows and even the glue-line disappears, the end-grain and flat-grain surfaces set up a visual vibration, a dancing of surfaces. Conceptually there's magic in the tight geometrical mating of two elements, the triangular interweave of dovetails, the knotlike locking of mortise and tenon. Joinery can indeed be the beginning of ornament, but it can be the culmination of it as well. —*C.E.*

Grainger McKoy's Carved Birds

A wooden covey on springs of steel

by Roger Schroeder

Though they are wooden feathers that spread out in flight, metal feet that cling to brass foliage, and basswood bodies that seem to defy gravity, the birds carved by Grainger McKoy look alive. One of the finest wildlife artists in America, McKoy has spent ten years perfecting his art. He has a degree in wildlife biology and training in architecture from Clemson University, but he learned nearly all his techniques from his mentor, Gilbert Maggione, South Carolina painter and bird sculptor. Maggione showed McKoy how to create dynamic postures and how to avoid the static forms common to decoy carving. He taught McKoy how to insert individual feathers and how to give unerring attention to anatomical proportions and detail. McKoy now knows so much about his birds that, pointing to a bobwhite quail he carved, he can tell you how old the bird it represents would be, and why.

Since his two-year association with Maggione, McKoy has made more than 75 bird sculptures, some consisting of a number of birds. His and Maggione's works have been exhibited at the Museum of Natural History in New York, as well as in shows throughout the East and South.

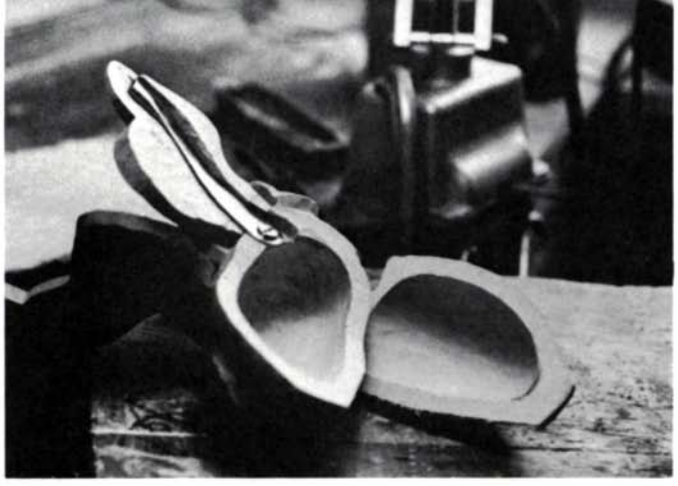
McKoy's workplace on Wadmalaw Island, 20 miles outside of Charleston, S.C., is a tin-roofed country store converted to a workshop and an upstairs studio. Near a window is an old graffiti-covered student desk where he does much of his carving. He has few traditional carving tools, and his only standing power tool is a bandsaw. About his desk are large piles of Styrofoam blocks, which he uses to make models of his birds. When I visited him in the summer of 1980, he was working on a commissioned sculpture of a covey of quail: 15 bobwhites exploding into flight (cover). The uppermost quail soars four feet above the base. His most ambitious project thus far, it wasn't completed until the spring of 1981.

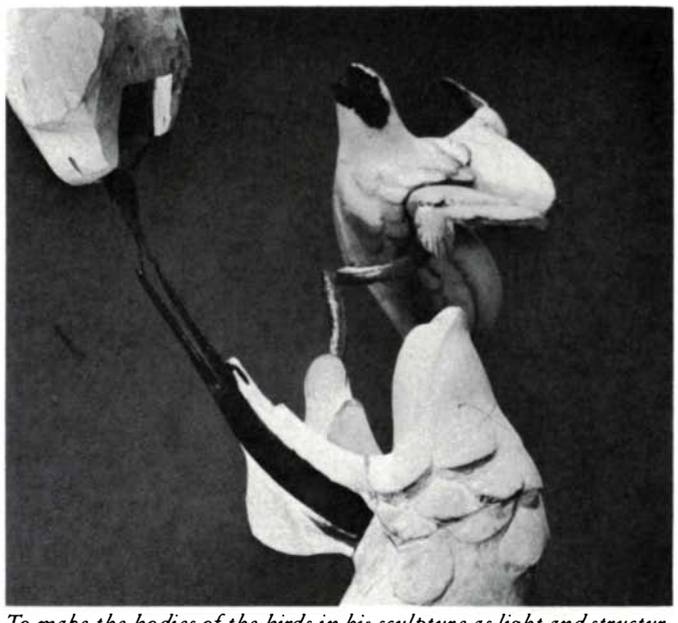
Though McKoy did make preliminary sketches of the covey, the drawings confined themselves to basic joinery and to the relative positions of the birds. He didn't do exacting sketches of his sculpture, claiming that too much planned detail would have bound him to a preconceived image. Rather, he let first the Styrofoam models and then the wood tell him how the sculpture would look. Each of the 15 birds began as a Styrofoam model. "They're easy to throw away," McKoy says, "just something you can play with." Cardboard wings can be variously positioned, and heads can be cut off, rotated and reattached with pins to test different postures.

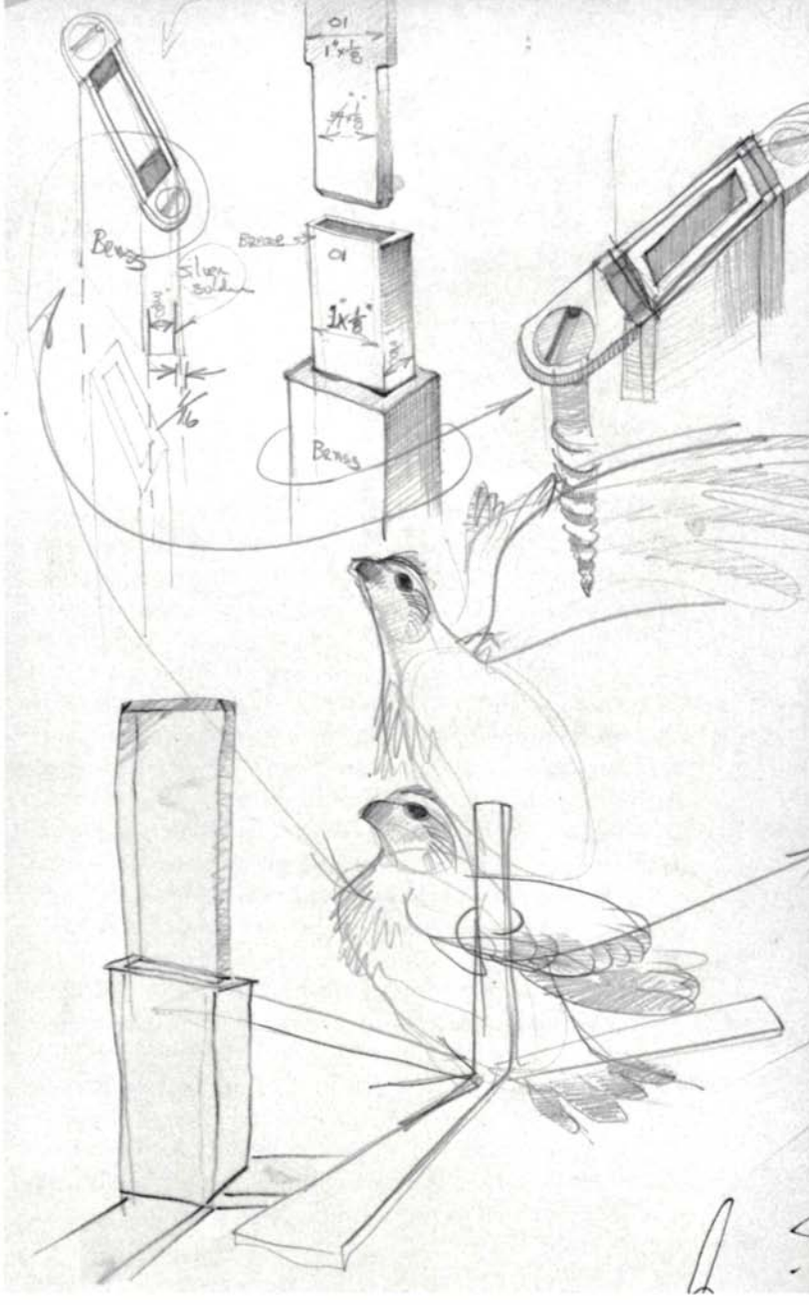
Before McKoy could begin carving the individual quail, he had to see how they would be positioned in flight. On a turntable work surface that economized his own motions, he used thin, vertical steel rods that held chemistry-lab clamps, which in turn held pieces of brass tubing at right angles. A wood screw through the flattened end of this tubing could temporarily hold a bird, either Styrofoam or wood, in the air. These supports allowed McKoy to position the quail wherever he wanted until he was satisfied with the places they all held.

One of McKoy's preliminary sketches of his covey sculpture, showing the steel-ribbon understructure that supports each bird.

McKoy's solution to keeping the birds airborne, without hanging them like mobiles, is ingenious yet simple. The quail are joined together from the lowest to the highest, even if only by the tip of a feather. Yet how could solid wooden-feathered birds support each other when the uppermost life-sized bird is four feet off the ground? One answer is that the quail are not solid wood. McKoy bandsaws the bodies in half and hollows them with a #5 gouge before rejoining the halves. This reduces the weight by a third or more. The other answer is that the birds are joined from top to bottom by lengths of ⅛-in. thick by 1-in. wide steel, an annealed high-carbon knife-blade steel that can be bent, ground, welded and then hardened by heat-treating in a furnace. The hollowed bodies have another advantage, for a steel ribbon runs into the bird's body cavity where wood screws hold the metal to the wood. Another length of steel can then emerge from beneath a wing and end as a detailed feather, complete with







To make the bodies of the birds in his sculpture as light and structurally stable as possible, McKoy bandsaws them in two and hollows out the insides with a gouge (photo, top). Note the high-carbon steel ribbon that has been let into the wing and screwed in place. This is part of the understructure of the covey that supports the birds impreceptibly, presenting the illusion of flight. McKoy devised a tenon-and-socket joint (above) which allows the pieces to be disconnected when necessary. The basic joinery was worked out in sketches as at right.

rachis (quill) and barbs, those parallel fibers that stand out like the teeth of a comb. To this steel feather is welded the steel counterpart of yet another bird. The rest of the feathers are individually carved of wood. Using the branching steel ribbon, McKoy can have one bird giving support to two others above or beside it, one at each wing. Where bodies and not wing feathers touch, steel supports are concealed elsewhere in the anatomy.

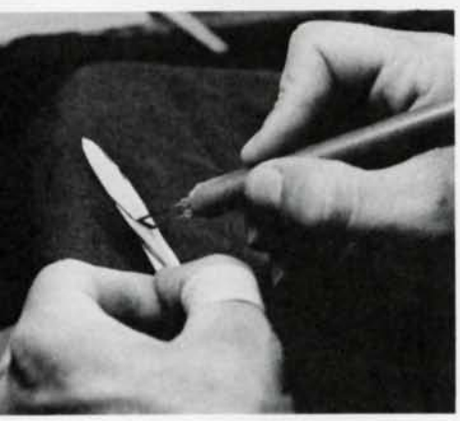
The problem of disassembling so many birds for carving and detailing was solved with a socket-and-tenon joint. By making the steel ribbon in sections and brazing two flat pieces of brass and spacers to the end of one, McKoy was able to create a slot to accept the tenoned end of another section as shown in his drawing above. So even where the tip of a steel feather is permanently welded to the feather of another bird, its other end can slip into a slot carefully hidden among wooden feathers. As a result, McKoy can simply lift birds off one another, enabling him to work on them individually, then replace them.

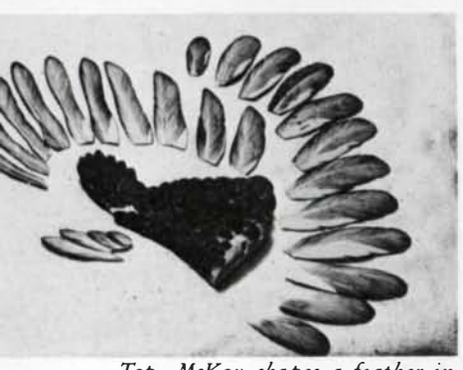
After each bird was mocked up in Styrofoam, its wooden counterpart was shaped on the bandsaw, though McKoy had to rough out each one at least twice before he got what he wanted. He used basswood because of its stability and resistance to checking and cracking. It contains little resin and so it is easy to paint. He has in the past used poplar for feathers because this wood can be cut extremely thin and still retain its strength. But poplar, McKoy points out, is fibrous, and thus is more time-consuming to work than basswood.

While the bone-and-sinew part of the wings was roughed out from thick stock and attached with screws to the quail bodies, the individual feathers began as ⅛-in. thick basswood blanks. After drawing an outline on the blank, McKoy carved with a 2½-in. pocket knife each of the bird's primary, secondary and tertiary feathers. These were then reduced in thickness with a hand-held, motor-driven, ½-in. by ½-in. sanding drum. The larger feathers could be held by hand, but for the smaller ones tweezers had to be used. For feathers that had to be bent, McKoy first heated the blanks on a bending iron and then bent or twisted them to shape.

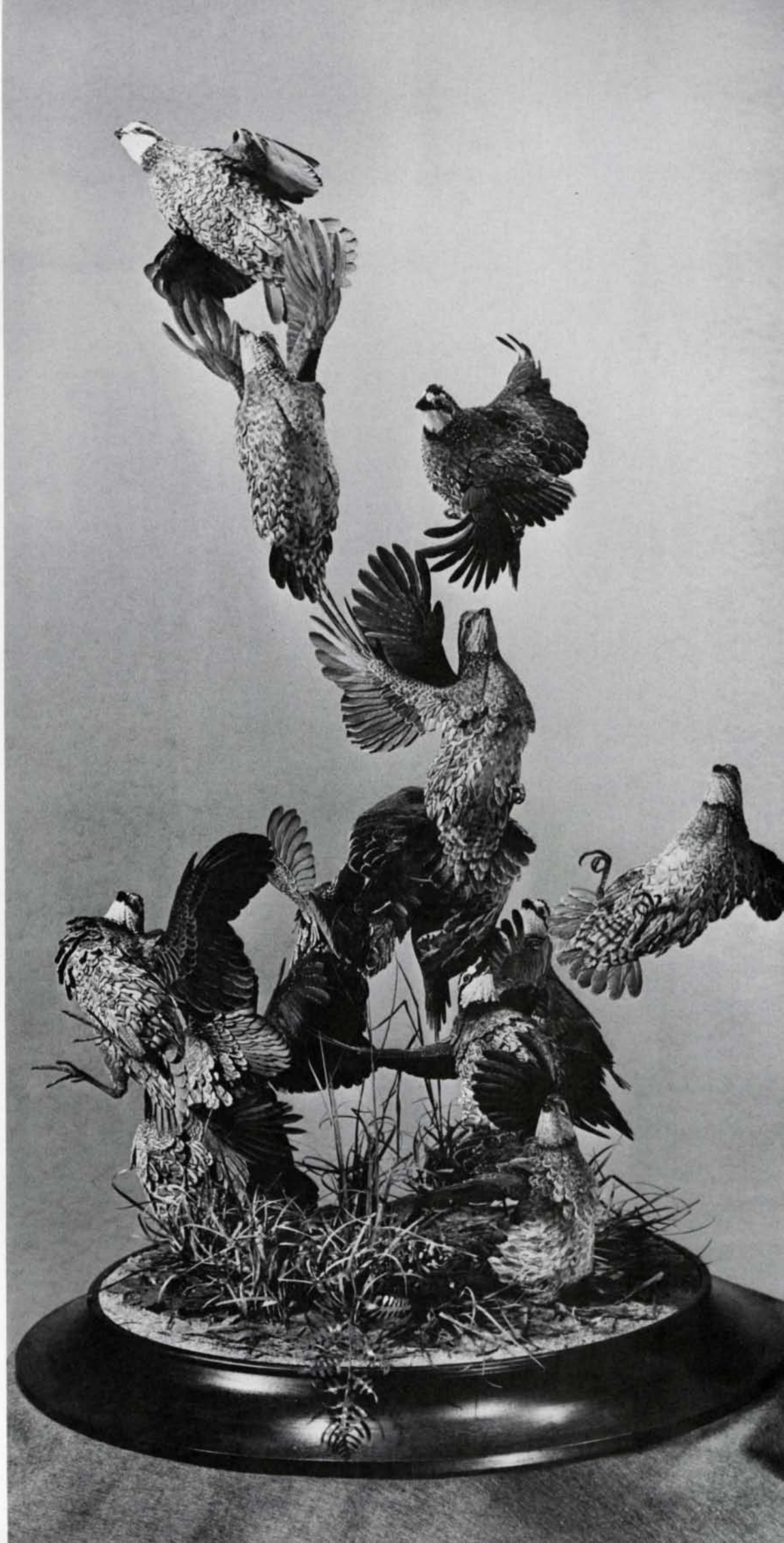
Once shaped, the feathers needed barb details. For this McKoy used a burning tool that has a skewed tip—the Detailer, manufactured by Colwood Electronics (715 Westwood Ave., Long Branch, N. J. 07740). It is held like a pen and drawn forward, the slanted end of the heating element burning a straight line into the wood. He also used the Detailer for burning in feather detail on the birds' bodies.

McKoy's attention to anatomical detail is evident when one sees a wing disassembled into as many as 22 individual feathers. Yet he claims that if he reproduced them exactly as they are found on a bird, each feather would have taken him



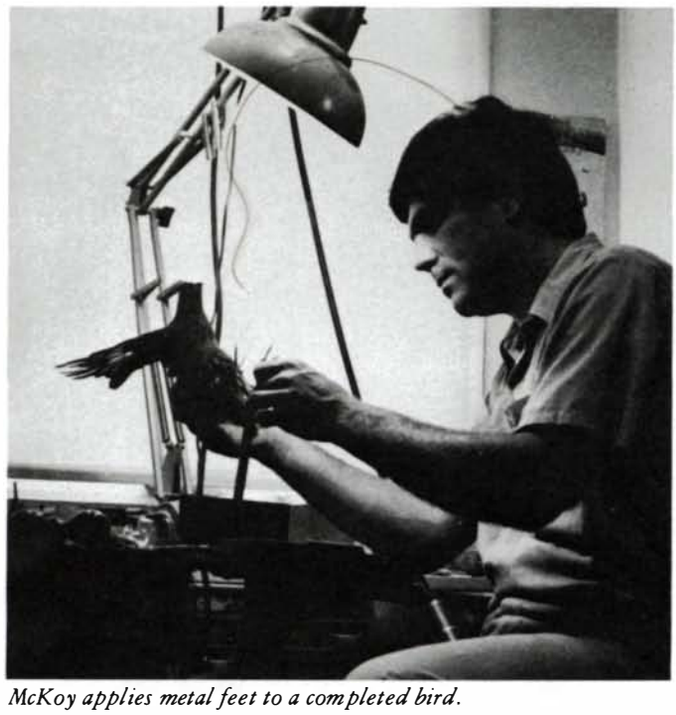


Top, McKoy shapes a feather in poplar using a sharp pocket knife. Next, he thicknesses the feather with a sanding drum in a Foredom rotary tool. Details (barbs and rachises) are then burned in with an electric hot knife. A wing may be made up of as many as 22 individual feathers (bottom photo). At right, the finished sculpture reveals an unexpected flurry of flight. Photo: Ted Borg.



For rough carving and shaping, McKoy uses a rotary stone in his Foredom power tool. The stone leaves behind a textured surface which enhances the expressiveness of the piece by deepening shadows.

For fine carving—defining and undercutting the feathers and other features—he uses a skew chisel and holds it much as you would a pencil. This grip affords little power but maximum control.



McKoy applies metal feet to a completed bird.

a day to complete, requiring, then, two years to do nothing more than the wing feathers of 15 quail.

McKoy's major tool for carving and shaping is the Foredom Series R rotary tool. Not only can the Dremel bits he uses work both Styrofoam and wood, but they can also add the details to a steel wing. For fine carving he uses a skew chisel which will undercut and define the feathers of a bird's body. But McKoy uses a rotary stone in his Foredom for coarse shaping. This setup will not produce sharp details. Instead, the stone will create a shadow effect that gives "expression, not duplication." This was of particular concern in the covey sculpture because the quail are meant to be viewed from a distance. Too much detail would look busy and detract from the overall effect.

The eyes of his birds are taxidermy glass, and the feet are brass, the metal being soft and easily worked. The toes of the quail, he solders on individually, and the completed feet are held in sockets in the birds' underbodies. The Foredom rotary tool again comes into play, with a carbide cutter used to form the scales on the birds' legs and toes. The feet of the still-grounded quail are brazed to lead plates in the base, which give the entire sculpture stability.

All of the quail were painted with oil-base paints, with the exception of the white areas, which were lacquered. He used lacquer because it could effectively cover the dark umber base produced by the burned-in details, which entirely cover the birds. Wings and feathers were removed, and painted with an airbrush to fill the smallest crevices. The final colors, however, were hand-painted. The process took an entire day for each bird. After the painting was completed, the feathers were glued into the wings.

About his sculpture, McKoy says, "This is the way a covey of quail might appear if frozen in flight by a stop-action photograph. But I didn't have any such photograph, and so I had to follow my instincts and intuitions in deciding how these birds look at the very moment they break from cover."

Remarkably portrayed are the instincts of flight and escape at the bottom, giving way to the natural grace of birds overcoming gravity at the top. It is a study in conflict that McKoy seeks to represent in many of his compositions. McKoy is a birdhunter and knows the habits of quail and other game birds. He is also licensed to collect game birds, and large drawers in his studio hold dozens of preserved birds, wings, and feet, all of which aid in his work. Yet, he does not want his works to look like taxidermy. His are wood sculptures in which anatomical accuracy must serve an expressive end. One recent piece, three weeks in the making, is what he describes as a pen-and-ink in wood. Out of a roughly carved basswood background emerges the body of an unpainted semipalmated plover—emphatically a composition in wood.

To McKoy the design of flight and escape are more important than carving technique or background. Over the years he has been de-emphasizing the habitats in his compositions, claiming that the background was dictating the piece and that they looked too much like museum dioramas. Always improving and simplifying his work, McKoy strives to avoid inert forms and excessive detail. Future works will probably include more examples like his pen-and-ink plover, where the concept of a bird as wood is clearly defined. □

Roger Schroeder, of Amityville, N.Y., is a woodcarver and freelance writer. Photos by the author, except where noted.

Burning-In Bird Feathers

by Eldridge Arnold

Man has had a long and varied experience with birds. He has envied them, worshipped them, painted and sculpted them and eaten them for dinner. Birds as symbols and motifs are everywhere, from King Tut's tomb to silver dollars, from pueblo petroglyphs to automobile ads. But the thousands of contemporary bird carvers in America trace the origins of their craft to the dinner table, and not to the making of feathered icons for hungry spirits.

Learning from the Indians how to make duck decoys with mud and rushes, American colonials soon began to carve decoys from wood and to color them with paint to achieve a lifelike quality. Anchored close to the hunter's blind, in shallow water, these wooden ducks attracted real ones, which made for good sport and tasty meals. These early decoys (those that have survived) are now collector's items and museum pieces. Decoys are still being made for hunting purposes, but most all of them are carved by machine or injection-molded from Styrofoam. And yet even with this great outpouring of machine-made models, the art of decoy carving is more widely practiced now than it ever has been before.

One branch of the craft, however, has evolved beyond just making decoys, and its practitioners find a special challenge in trying to reach absolute realism in their work. Not only do they pay closer attention to form and posture, but they strive to replicate the tiniest of anatomical details, down to the very barbs of the feathers. Texture is the subtlest and most difficult quality to get, created by a combination of carving, burning and painting.

Once the body of the bird is shaped and smoothed, and the parts for the feathers have been cut, you can pencil in the outlines of the individual feathers (photo, below left). Instead of carving around the feathers on the body, which gives them a shingled, layered look, I prefer to burn-in the edges, as well as the barbs. There can be as many as 300 barbs on a small ¾-in. long feather; so a good deal of practice with the burning tool is needed to get the required degree of control.

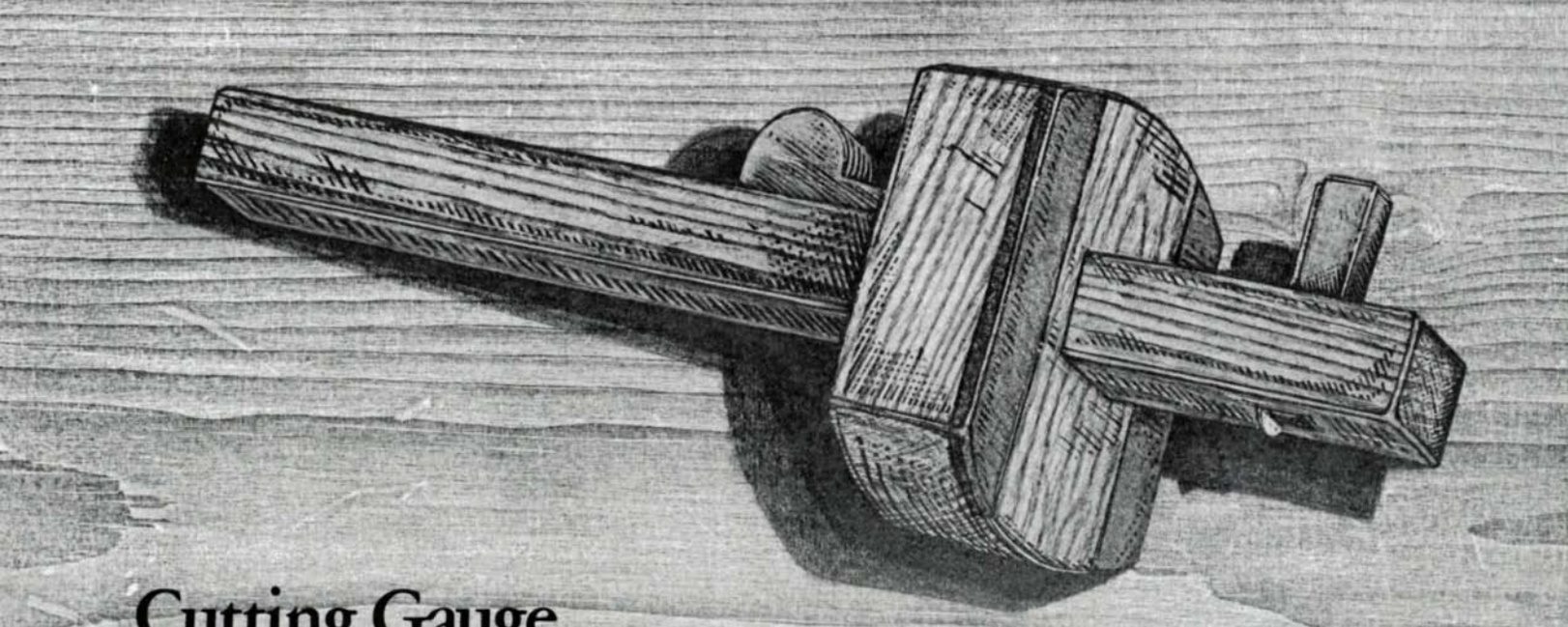
I use a couple of different burning tools—the Hot Tool, available from Hot Tools, Inc., 7 Hawks St., Marblehead, Mass. 01945, and the Detailer, made by Colwood Electronics, 715 Westwood Ave., Long Branch, N.J. 07740. The latter has a rheostat control, allowing you to regulate the heat; the Hot Tool also can be equipped with an accessory heat-control unit. The skewed tip of the tool must be kept sharp, and its beveled faces cleaned often during use. I use 320-grit wet/dry sandpaper tacked to a block of wood to hone and clean the tip.

The burning pen is gripped somewhat like a pencil, but is usually moved away from you in sweeping strokes. Pausing too long will make the line dark and deep, and stopping at the end of a stroke will create a dark blob where you want the line to be finest. To avoid this, follow through with each stroke and lift the tool, while it is still in motion, from the wood. With practice you can develop a rhythm that will make the work proceed efficiently, but even then it takes several hours to burn-in the barbs on ten or twelve feathers. Because the barb lines are so close together and because you can't interrupt the motion of the tool, intense concentration is required, and it's best to take frequent breaks to keep from ruining your work. Most lines on feathers are slightly curved. To get the curve, you have to rotate the tool minutely as you move along the line. Use only the point of the tip, not its whole edge, and avoid making absolutely straight lines. Every carver has his own style, and with practice you'll find your own.

Burning-in these details imparts a warm, vibrant texture to the wood, and gives it a lifelike quality you wouldn't get from carving or scratching. I like the brownish color of burned lines to show through the paint. It adds a subtle touch of realism to the finished sculpture, and it shows the craftsman's hand. □

Eldridge Arnold, a retired graphic designer, is now a sculptor in Greenwich, Conn. For further reading on this topic, see Pyrography, The Art of Woodburning, *by Bernard Havez and Jean-Claude Varlet, Van Nostrand Reinhold, 135 West 50th St., New York, N.Y. 10020.*

Using real birds and photos for models, Arnold pencils in the outlines for the body feathers on a mourning dove, above. Several feathers on the bird's flank have been undercut to give them a shingled look, something the author does judiciously. Working in his lap, right, Arnold burns in the barbs of the feathers he has just drawn. The burning pen is drawn away from the body in sweeping strokes, and the thickness and depth of each line is controlled by pressure and duration of stroke.



Cutting Gauge

The right tool for cross-grain layout

by John Lively

Nothing quite beats the cutting gauge for scoring across the grain. For striking dovetail baselines and shoulder lines for tenons, dadoes and rabbets, it's an especially accurate and handy tool. It can also be used to eliminate splintering when crosscutting by scoring the wood prior to sawing, though this requires an initial crosscut to within an inch or so of the final length to give the gauge an edge to ride against.

Unlike the ordinary marking gauge whose steel scribing pin is designed to mark along the grain, the cutting gauge is equipped with a cutting spur, which when properly ground and honed, severs cross-grain fibers cleanly. Used across the grain, the marking gauge can tear the wood and produce a ragged line, but the cutting gauge incises a neat, clearly visible cut, just the right thing to accept the edge of a sharp chisel when paring away the last bit of end-grain tissue.

The only commercially available cutting gauge on the American market is made by Marples (England) and is sold by most mail-order tool suppliers for about $14. Usually made from beech, the fence has two brass wear strips let into its face, and is bored and tapped to receive a plastic thumbscrew which tightens against the stock and locks the fence in place at any distance from the spur. The Marples cutting spur is ground to a spear point and beveled on both skewed faces and is flat on the back. The spur is held firmly in the stock by a brass wedge. If you buy one of these or already have one, you'll get it to work better by regrinding the spur to a round-nose profile as described below.

Instead of buying a cutting gauge you might want to make one. Start by selecting and dimensioning the material for the fence and stock. A stable, relatively dense hardwood like maple or cherry will do. Though the pieces themselves are small, it's best to cut the blanks large enough to machine them. The fence blank should be planed to a finished thickness of 1 1/16 in., ripped to a final width of 2 3/16 in., but leave the block about 14 in. long for now. Thickness the blank for the stock (bar) to 3/4 in. square, cut it to its finished length of 7 1/2 in. or 8 in. and put it aside.

Now pencil the outline of the fence in the middle of the blank. The fence is about 2 3/4 in. long (its length really depends on what size most comfortably fits your hand), and it is radiused top and bottom. Orient the layout so the grain runs vertically, from one rounded end to the other. To mortise the fence to receive the stock, locate the center of the fence and construct a 3/4-in. square about it, knifing-in the lines on both faces so that you have two squares directly opposite one another. Next bore a 5/8-in. hole through the block, centering the bit in the square. Enlarge and square up the hole, finally paring from knife line to knife line on all four sides of the mortise. The stock should slide freely through the mortise, but with no wobble side to side or up and down.

Fence and stock are locked together by a wedge, which requires tapering the top of the mortise at about 10°. Find the angle with a sliding bevel, and knife a line on the inside of the fence the proper distance above the top of the mortise. The tapered slot for the wedge is 5/8 in. wide; this will leave a 1/16-in. wide untapered shoulder on either side of the mortise. These keep the stock from flopping up and down when the wedge is removed. Pare down the end grain with a 5/8-in. chisel to form the slot, taking care to stop the taper just short of breaking through at the other end. Cut the wedge to fit the angle of the slot, but make it about 1/16 in. narrower than the slot is wide. The lateral play here, along with the prominent hump on the rear of the wedge, lets you wiggle the wedge side to side when you want to remove it.

Cut a 1/2-in. wide by 1/8-in. deep rabbet down both sides of the block on the face side (opposite the wedge side). These receive wear strips which you can make from a dense tropical wood like lignum vitae, ebony or rosewood. Finally, bandsaw the fence from the blank and epoxy the wear strips in place. When the glue has cured, sand the strips flush with the face, and smooth the rounded top and bottom edges.

Grind the cutting spur from a length of old hacksaw blade. It is 5/16 in. wide and 1 1/2 in. long. You ought not break it off until you've ground and honed the edge. The business end is first rounded and then beveled to a sharpening angle of about 20°. The rounded edge keeps the tool from digging in

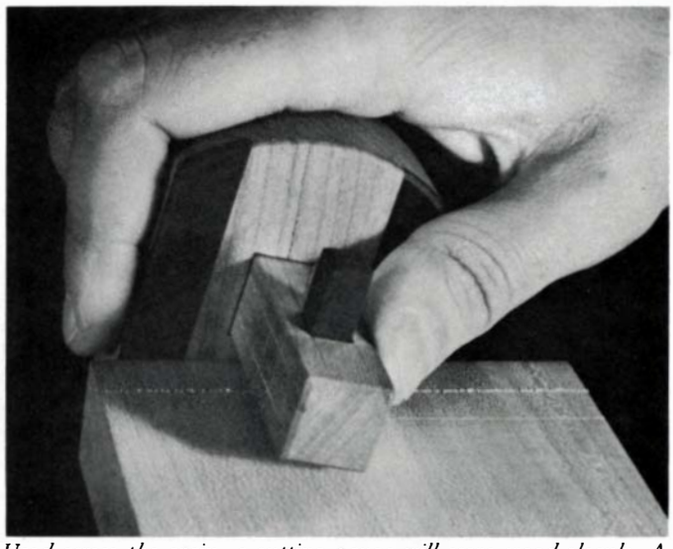
and dragging. Back off the unbeveled side on a stone, hone the bevel, then back it off again. Soften the upper edge with a file after snapping it off.

Cut the mortise for the spur and its retaining wedge about ½ in. from the end of the stock. Proceed as you did when mortising the fence, only taper the outside wall the full width of the mortise; lastly, fashion the wedge from the same tropical wood you used for the wear strips.

Traditionally used, the cutting gauge (and the marking gauge for that matter) is pushed into the work rather than pulled. This requires adopting a special grip to get consistent, accurate results. As shown in the photo at right, the index finger wraps around the top of the fence, while the thumb, positioned against the stock directly above the cutter, powers the tool. If you try to push the tool by its fence, it's liable to get slightly askew and bind against the wood. Trying to cut the full depth in the first pass can also cause the cutter to bind, drag and even wander; so first make a light pass. Having easily cut a shallow groove straight and true, you can make a second pass to final depth without risk of binding or wandering, because the scoring spur cannot deviate from the groove it cut first, and half the work is already done.

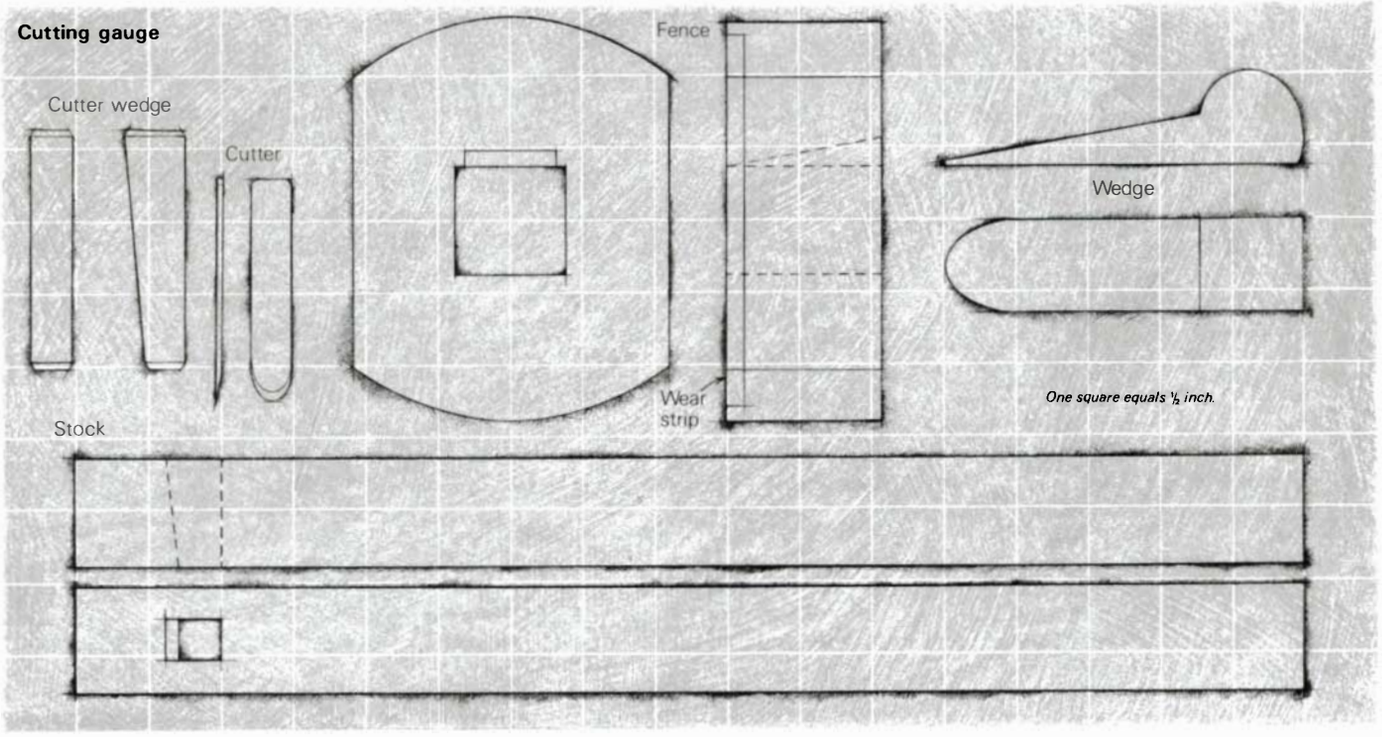
The orientation of the cutter is important, and can be different, depending on whether you are left or right-handed. If the toe of the spur is inclined toward the fence even slightly, you'll have a hard time getting a straight cut because the spur will want to push the fence away from the edge as you move the tool along. If the heel of the spur is angled toward the fence, it will wedge the fence against the edge during the cut, tight enough to cause binding if the angle is too great. Ideally the cutter should heel-in toward the fence one degree or less; this combines ease of operation with a slight wedging action, which means that you don't have to jam the fence against the edge of the board with barbaric force. Shave small amounts of end-grain tissue off the rear wall of the mortise in the stock until you get the right degree of skew.

For most woodworking operations, the bevel of the spur should face the fence, a condition that means that the beveled side of the scored groove is in the waste and that the groove wall on the other side is perfectly vertical to the face of the board. This vertical wall is plainly visible (the end-grain has been burnished by the spur), and it makes the task of end-grain paring (*FWW* #27, March '81, p. 72) considerably easier. You've already got a ledge about 1/32 in. wide on either side of the board to position the edge of your chisel for the final, leveling shave.



Used across the grain, a cutting gauge will score wood cleanly. A marking gauge has torn the wood fibers and left a ragged mark.

The cutting gauge is more than a marking tool. Its spur actually cuts the visible shoulder line of the joint it's laying out. The careful chiseling you do between the scored lines, the nice end-grain surface you leave behind, gets covered up when the joint goes together. But the clean, straight line you scored with the cutting gauge is what you see and feel once the shoulder is pulled up tight. In laying out a joint with a cutting gauge, you make the final cut first. □

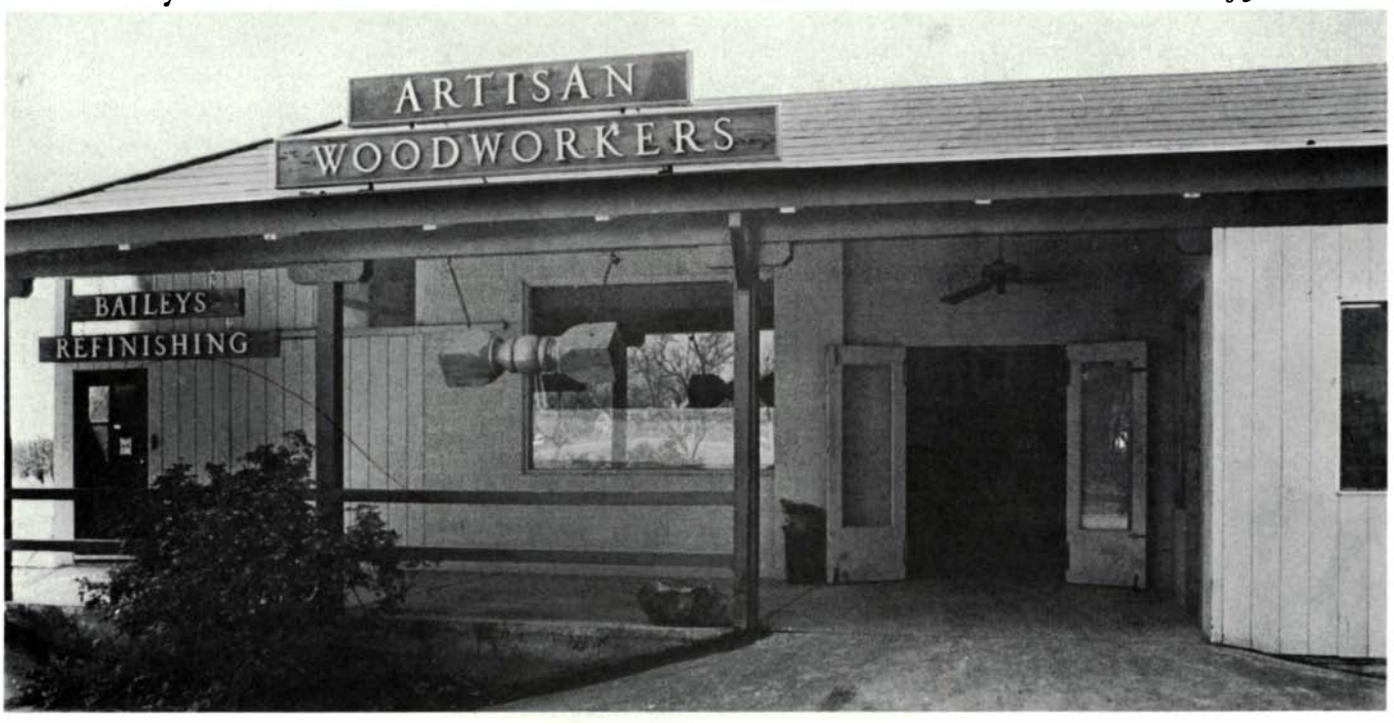


Illustrations: E. Marino III

The Business of Woodworking

The diary of Artisan Woodworkers

by John Ward



March 4, 1980—You ask why I, as a relatively experienced designer and woodworker, have contracted to work for a year at $5 an hour in a cabinet shop. I want to open my own shop next August. I need to learn *commercial pace.*

I like the work, the tools and techniques are exciting. Good cabinets are made to exacting standards right from the beginning. I watched Kevin enumerate every piece in a kitchen in a few hours, then stack them in a certain order for Randy and me to assemble. . . . When I came here I was astounded to find four shapers and ten routers in a three-man shop. All four shapers and nine of the routers have the same cutters in them all the time, and only one router serves as a variable. John P. (who owns this shop) knows how to design around those fixed set-ups at reasonable prices. So when a customer asks for a special design, John either works it out within our tool set-ups, or he turns away the job. This is right where I would have spent hours designing, lying awake at night, buying new tools, etc. This inclination burns you up in a commercial setting. You cannot charge for lying awake at night, but in the bigger economics of life you are paying for it. . . .

April 17, 1980—In the cabinet shop this artist has learned to simplify technique, to work steadily, to step lively and anticipate future steps, to economize on motion, to repair mistakes as they happen, not to flinch and postpone. . . .

One day I noticed a carved rose on the back of an old rocker at my grandmother's house. Anxious to know the technique I examined it and was startled to see that the whole complex flower was made with about 20 deft chisel cuts. That's all. With the leaves and background it must have taken 15 minutes. That exquisite hand-carved rose was a skillful blend of economy and beauty. I imagine the carver did not dote on its uniqueness and stylistic consequence, he probably did 40 of them that day. . . .

June 16, 1980—I found a building in Sonoma for my new shop and it is magnificent! So much potential. . . .

August 26, 1980—Commercial pace? I'm too busy to write about commercial pace. It's nice to work with company. I have a helper already and there will be three of us here by the middle of September. I've sublet two shops, one to a luthier and one to a finisher, and we still have room for a showroom. We have jobs through Oct. 1, and I spend half my time selling and administering.

When you finally go into business you must enjoy the whole picture. First you like the woodwork, then you must find buyers, then there's ordering, storing, keeping track of a thousand details. What if somebody wants to steal some of your valuable tools? What if a fire starts in your trash barrel? Taxes, insurance, repairs. If this stuff gets you down, don't go into business, except as a one-man show in your garage or barn. That too is subject to the basic constraints of what is economical and what is not. . . . I break my back six days a week, ten hours a day to get started and then I drop by the shop in my spare time to relax there because I really do enjoy it. But mainly I am a designer and I am working on my sanity. . . .

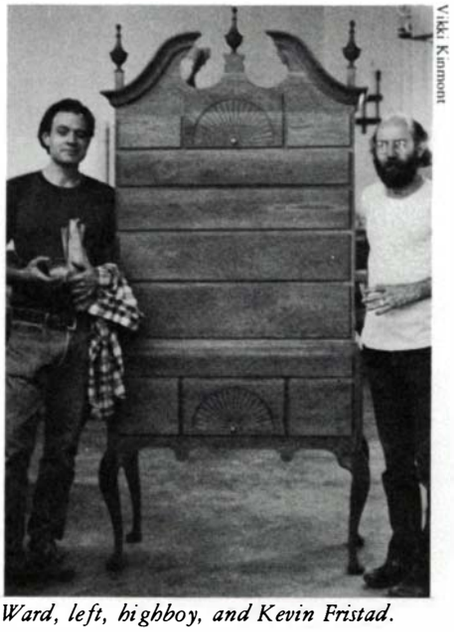
EDITOR'S NOTE: John Ward of Sonoma, Calif., is an artist, designer and woodworker. Several years ago he decided that his art was too precious and self-indulgent, so he downed tools to think things over. When he returned to woodworking, he was determined to master the craft, to create a successful business, and to develop his artistic talents within that context. When I met him two years ago, he was working in a kitchen-cabinet shop and he talked a lot about "commercial pace." This article is excerpted from the letters Ward wrote to me while chasing his vision. Recently, he's published a book: *Commercial Cabinetmaking Procedures*, available from Artisan Woodworkers, 21415 Broadway, Sonoma, Calif. 95476, for $12.50. —*John Kelsey*

September 18, 1980—Business has galloped into kitchen cabinets. I found I couldn't administer and also direct the shop. Having hired Kevin, I feel freer to run the business end properly. He is awesomely competent in the shop, a much better woodworker than I, but less a planner, seller and designer. We all play our parts, and I'm liking that a lot. But, if I'm not spending more time in the shop soon, I won't be in this business for long.

My buddy ran his fingers through the table saw ten days ago. Hamburger and blood everywhere. Nothing lost, but he is badly maimed. I'll never forget it. Commercial pace!

November 8, 1980—I've come to the conclusion that I have very little to say about commercial pace except that I have a drive to do it....For $525 a month rent and all the other usual costs of being a three-man shop, we must gross about $9,000 a month to break even. By definition, our work time is worth $20 to $25 per man-hour. We must do lots of standard stuff to meet this figure. By standard I mean things that can be carried out regularly, efficiently, to meet a need and a chosen market. This does not preclude fine work and good design. Maloof's chairs are his chosen standard....

We're rapidly building a good reputation. If I could find a secretary or a manager, that would help a lot. But we can't afford it yet....



Ward, left, highboy, and Kevin Fristad.

February 11, 1981—I've spent four days woodworking since the New Year. I'm a businessman. I'm also a woodworker, designer, husband and papa, and I like all of those things. But as perpetrator of this Artisan Woodworkers fantasy/reality plunge, I'm also the mother of every facet of the business. With costs being what they are, we now have to hustle $12,000 a month. I'm not interested in milking my employees and if we ever make a profit I will cut them in. Oddly, now, I am paid the least....

So I finally arrive at some concrete financial advice: Get some experienced financial help before you start. Itemize every cost you can think of and then, for start-up, double it. Once underway add 25%. Then try to do a cash flow—how much business will you have to do to pay the bills each month? You can project for a year ahead, and in this way you can ground-test the bird before you fly it, simulating fat and lean times and asking yourself, "What would I do if...." I did this and it really helped.

I have a new motto for myself: Don't start anything in the shop that someone else can't finish.

Here are some more dos and don'ts that expedite things. Try to have all materials delivered, woodworkers make expensive go-fers. Buy surfaced lumber when you can. Make it clear who does what, and when. Only one person answers the phone and meets customers. One person looks after machinery. One person coordinates work in the shop. Entertain elaborate design and technical departures only when there is some prospect of payment.

I had to fire my friend. Emotionally, it cost me dearly.

June 11, 1981—Heading down the stretch, another few months and this business will be profitable. The books showed us in the black by April. But jobs just barely keep pace with our needs....

For the good of our souls, Kevin and I put about $7,000 worth of time and materials into reproducing a 1750 highboy chest in cherry. We swam with success. I was thrilled to carve the fans and to find the bonnet moldings so easy. Kevin said it was the most exciting woodworking he'd ever done.

August 8, 1981—This has really been a rough summer. Success is tough just before it's profitable. My former friend and former employee sued me yesterday for having no guard on the saw that he stuck his fingers into. "Serious and willful misconduct," it says. I say he would have removed the guard anyway. I'm, a bit sick from it all....

August 27, 1981—It's just about a year since we opened up. There are four guys in the shop, and me and Suzi in the office. We have to gross about $900 a day to be profitable. That's a lotta nice woodwork, but hustling that much work in this economy is spooky for me.

Yesterday I stumbled into the shop having shaken off the four-day flu in two days. Today for the first time I did not want to go to work. A whole summer of seven-day weeks capped by a visit from my sister and the flu. But I went back anyway, and I'd say that commercial pace is an insane habit. I even have a boil on top of my head....

September 16, 1981—This month commercial pace has come down to organizing the volumes of planning, meeting, arranging, ordering, producing, delivering and following-up that a six-person woodworking business stirs up. Even at gross of $16,000 to $18,000 per month there is little profit and lots of stress in the 60-hour workweek. So even if it doesn't get more profitable, I'm going to take steps to organize it better, so I can relax on what little I make.

October 2, 1981—The crew and I are just finishing two wine cellars (13,000 bottles each), one for a store in a posh resort and the other for a winery. I designed them in July, in one of those moments I'm always advising myself not to take, and that design flash got molded into $24,000 worth of work for us, plus $5,000 worth of spin-off for friends who are installing the two cellars.

We are becoming an intimate production team. The six of us seem to have arrived at a good plateau. I couldn't keep more people working efficiently, and our reputation does not draw well enough for the shop to become any bigger. I'm going to take a brief vacation and then go out and sell the shop's capabilities to builders and architects who have expressed an interest. After more than a year, this will be my first concerted bit of promotion.

I've set up an indoor badminton court in the warehouse-for-rent that adjoins our shop. Commercial pace? It's stamina, you need stamina to make it in this business.

The Business of Woodworking

Stepping back up to amateur status

by Robert L. Buyer

Business, craft and art magazines are full of articles extolling the virtues of craftspeople going into business for themselves. You can read about every phase of running a small business, from advertising to taxation, all of it based on the premise that it is wonderful to venture out on your own. It seems heresy to suggest that you may not be suited for such an undertaking or that your business might fail. After all, initiative and hard work are always justly rewarded, aren't they?

Buyer tunes his sawblade.

After years of working in industry for my living, while satisfying my soul by woodworking in every available minute, I made the big decision to start my own full-time woodworking business. Now, three years later I have returned to industry for my job, and I continue woodworking as an amateur. This may be a minority report, but having tried and failed in business, it's with much joy that I am stepping back up to amateur status.

When you start a business of your own, before long you are engulfed in your bookkeeping, advertising, inventory, scheduling and selling. Soon you become so enmeshed in running the business that you yearn for the opportunity to work at your craft. You may think, "That may be true for a large shop, but it certainly can't happen in my one-person operation." I believe it happens more easily in the small shop than in the medium-sized business. The unhappiness that results from spending so much time managing a business that you cannot work at your craft is a major reason for the collapse of many small shops.

Craft skills must be balanced with business skills in order to survive. Business skills truly are necessary and they'll consume a significant portion of the working day. If you want to concentrate on the craft aspects of a business, the business side can be purchased—assuming you can afford the financial burden.

The financial requirements of a small business are also often underrated. Working on a shoestring is possible when it's a hobby, but when it becomes a full-time job, the amount of money you need takes a quantum leap. Statistics show that one of the great causes of small-business failure is the lack of financial backing. You can lose everything you own.

Another surprise in my business attempt was finding that although the business was diversified enough, I was not. As an amateur, I could operate my saw mill, do some cabinetmaking, teach a few classes, and do a little woodcarving. When I tried to do the same things as my sole means of support, I needed the services of a machinist, welder, mason, logger, electrician, trucker and rigger. I could afford all these services as an amateur, but they became intolerable drains on my resources as a professional.

Machinery failures that the amateur can work around become crises when delivery schedules and profit margins are at stake. As an amateur, I could usually find a way around the shortcomings of my machinery. I could always do it by hand, or invent a new jig. But as a professional, I simply did not have time to invest in an imaginative solution to a mechanical problem. The professional relies on being able to do jobs routinely so production stays high. Profit margin restricts the latitude you can grant to design and production. If you get your satisfaction from creating new products or imaginative new uses of materials, you will be disappointed in business.

While in business for myself, I got the most satisfaction from helping people, from seeing the worry lines disappear off the face of a customer whose problem I was able to solve. This satisfaction, however, also rewards the amateur.

It was difficult for me to accept the compromises in quality that were necessary to stay in business. Probably I am too much a perfectionist, but stopping sanding at 150-grit was difficult when I preferred to go to 220, even though I knew the competition stopped at 100.

Realizing that a potential customer could make it possible for me to eat and pay the bills certainly made me more tolerant. Running a business is humbling. There is always someone who is doing better or who can do the job for less. I found myself accepting undesirable jobs to stay alive, learning to smile when I was angry or hurting. The good part of that is, most of us could use a dash of humility.

Now that I have returned to industry for my livelihood, I continue all my former business activities on a part-time basis, but with different attitudes and objectives. Now, I am free to respectfully decline jobs that don't fit my plans or inclinations. I have time again to attend and participate in exhibits, to study, to keep up with current trends.

But the greatest benefit of returning to amateur status has been the restoration of joy in the high quality of my work. Now I am free to spend as much time designing a child's toy as I would spend on some "worthwhile" task. I can take the time to make better joints or to polish a finish with pumice and rottenstone. I can raise my standards and improve the quality of my work without being penalized. My woodworking ideals take precedence again.

One final word: balance. To be happy and successful, life must be a balance of labor and leisure, physical and psychological, concrete and abstract. This balance does not just happen naturally—it requires delicate adjustment. Working in industry my physical activity is limited, so I use woodworking to increase (balance) my energy output. As a hobby or avocation, woodworking helps me to balance my life. As a livelihood, it produced imbalance.

Bob Buyer lives in Norton, Mass.

The Business of Woodworking

Strategies for sales and marketing

by Henry Intili

Working with wood is something I have loved all my life. I thrive on the smell of cherry and walnut in my small shop, on the joy of transforming rough-sawn lumber into beautiful pieces of furniture. But while I can approach wood with a purely aesthetic mind, I am also a small businessman, responsible for all phases of my company from purchasing and operations to sales and designs.

The qualities that make me a successful craftsman are not the same as those that make me a successful small businessman. In this article, I'll explore some of the skills necessary to create and maintain a small business.

There are three major considerations to be dealt with when building a business: proper management, sufficient capital and most importantly, an ability to sell effectively. No business can survive without sales or the overall management of the direction of sales, which is called marketing. And yet, this is the area in which we woodworkers are most reluctant to invest creativity and perseverance.

In general, marketing is simple. You determine what you have to sell, you find out what the public wants, and you devise a plan to bring the two together. Good marketing will arouse a curiosity in the potential customer, who will want to know more about your product and perhaps consider doing business with you.

What are our products? What do we have to sell?—It is a common mistake to believe that customers buy objects. They don't. They buy the qualities they believe come with those objects, like durability, selection and personalized service. Customers are looking for the "old-time" qualities of grandma's era—solid woods, mortise-and-tenon joints, dovetails. They want furniture that will last, they want to deal with reliable people, and they want to enjoy the "snob appeal" that having furniture custom-made affords. In other words, they want to be proud to own an individual work of art that they can show off to their friends.

We don't sell joinery or fancy woods or precision construction. We sell the benefits derived from such features. The man who works for me sells me quality dovetail joints. But I sell furniture that is durable, personal and a thing of beauty.

Who are your potential customers?—Walk into any large furniture store and you will find an array of high-priced items that just begins to match the quality of your work. Somebody is buying these expensive pieces. Your job as a small businessman is to find those people and interest them in your work. If a store with its large markups can sell quality hardwood furniture at a profit, so can you.

The potential customer enters the sales situation with three givens: he has already decided to buy, he has the money to purchase and he is the decision maker. You do not sell to a potential customer, rather you persuade him to want you to make the thing he has already decided to buy. Lookers and future customers are always welcome, they are the stuff of next year's orders. But the true potential customer, the person searching for what he is ready to buy, is who you must locate and interest.

How do you find potential customers?—You do not find customers, they find you. In our own business, we use about 20 different marketing methods to gain exposure and recognition. This will happen only when our name becomes synonymous in people's minds with the products we have to sell.

Whatever marketing tactics you decide to use, remember this rule: Everything you do must be repeated over a long period of time. Here are some of our marketing tools:

Business cards, stationery and signs: These should be simple, direct and professionally done. Cards must include a short statement about what you manufacture, and stationery should include letterhead and business envelopes with your company name. Our cards and letterhead carry this slogan: "Quality hardwood furniture built to last a lifetime." Attractive signs can be made or purchased for the side of your business vehicle, your home or shop. The quality of your advertising reflects the quality of your work. Let it announce the care and craftsmanship of your products.

Advertising: Run your business card full size, every week in the local paper. Rates are usually low for long-term contract insertions. List your telephone number under "Furniture—Custom" in the yellow pages. Large ads may not pay back but should you want such an ad, use your business card. Locate a quality radio station and establish a long-term contract for 30-second spots. You can say a lot in 30 seconds.

Newspaper stories, radio programs: Local papers are always looking for stories about interesting local people. Invite a reporter to visit your shop. It's an easy story for him and good, free advertising for you. Just be yourself.

Weekly, we sponsor a 10-minute radio program called "The Woodworker's Corner" whereby listeners call in with questions about woodworking and refinishing. The station charges us their lowest rate because our show helps their own programming. This is our best media advertising.

Sales presentation book: Prepare a handsome photo album of all your pieces. Use color photos taken by a good photographer. Put no more than two pictures on a page and place a caption under each one. When possible, include photos of your furniture installed in customers' homes, but don't mention the customer's name in the caption. Your book should also include a photo of you in your shop and any newspaper stories about you. This book is one of your most powerful tools. Spare no expense in its preparation and let it express the pride you feel in your work.

Art shows: Most counties and cities have a local art association. Join the organization, participate in its activities and display at its annual show several pieces that declare what you build best. Don't attend with the idea of selling a bundle. Instead, look at it as exposure and as hands-on advertising.

Use the art show to talk to people. Remember, if someone

Henry Intili, 36, operates Yvonne's Furniture in Jasper, N.Y.

takes the time to walk into your booth, it's for a reason. Discover that reason by talking and asking questions. Accept compliments with a "thank you," and then ask what specifically the person likes about your work. Display business cards and presentation book and encourage people to sign a mailing list. Be well-groomed, friendly, professional. Take notes on everyone you talk to. Arrive early and stay late.

Craft fairs: We usually do not attend craft fairs, except occasionally to expose some of our smaller items. We don't go to fairs far from home, for we prefer to sell to the local marketplace and to build up a loyal clientele.

One man show: Several times a year we show our furniture in conjunction with a downtown store (carpet stores are good). We precede these shows, usually two days long, with extensive radio and newspaper advertising.

Galleries: Since we prefer to deal directly with the customer, galleries play almost no role in our marketing scheme. A gallery usually inflates the price of your work, provides exposure to only a small number of people, has a limited commitment to your work and growth, and cannot take custom orders with any facility. Best to avoid this approach. (For another view of gallery representation, see p. 103).

Customer parties: Once a year we hold an open house and buffet for all our past customers. These people have trusted us once, they are a major source of new orders, and our best salesmen as well. Repeat business from happy customers is the backbone of any small business. Treat your old customers with special care and they will repay you in kind.

Special sales: In the late fall, we usually have a sale on those demonstrator items we toted from show to show and did not sell. We announce this sale only to people who signed up on the mailing list, and we don't mention it in our other advertising. People on the mailing list receive a letter thanking them for stopping at our display and telling them that this sale, open only to them, is our way of saying thank you.

Schools: Schools must buy durable furniture. Make an appointment with the superintendent of schools. Ask for a minute of his time to discuss something that will save him money while improving the quality of his physical plant. Then briefly explain that you design and manufacture durable, attractive hardwood furniture at considerably less cost than he can purchase it from his regular suppliers. Ask him who in the school system you should talk to about this, and ask him to make a phone call of introduction to that person. A potential customer is the one who makes the buying decision. Start with the person who signs the paper.

And finally: Talk, Talk, Talk. At social functions talk about yourself and your work. Ask for comments about your latest problems and orders. Show the enjoyment and satisfaction you feel in your work.

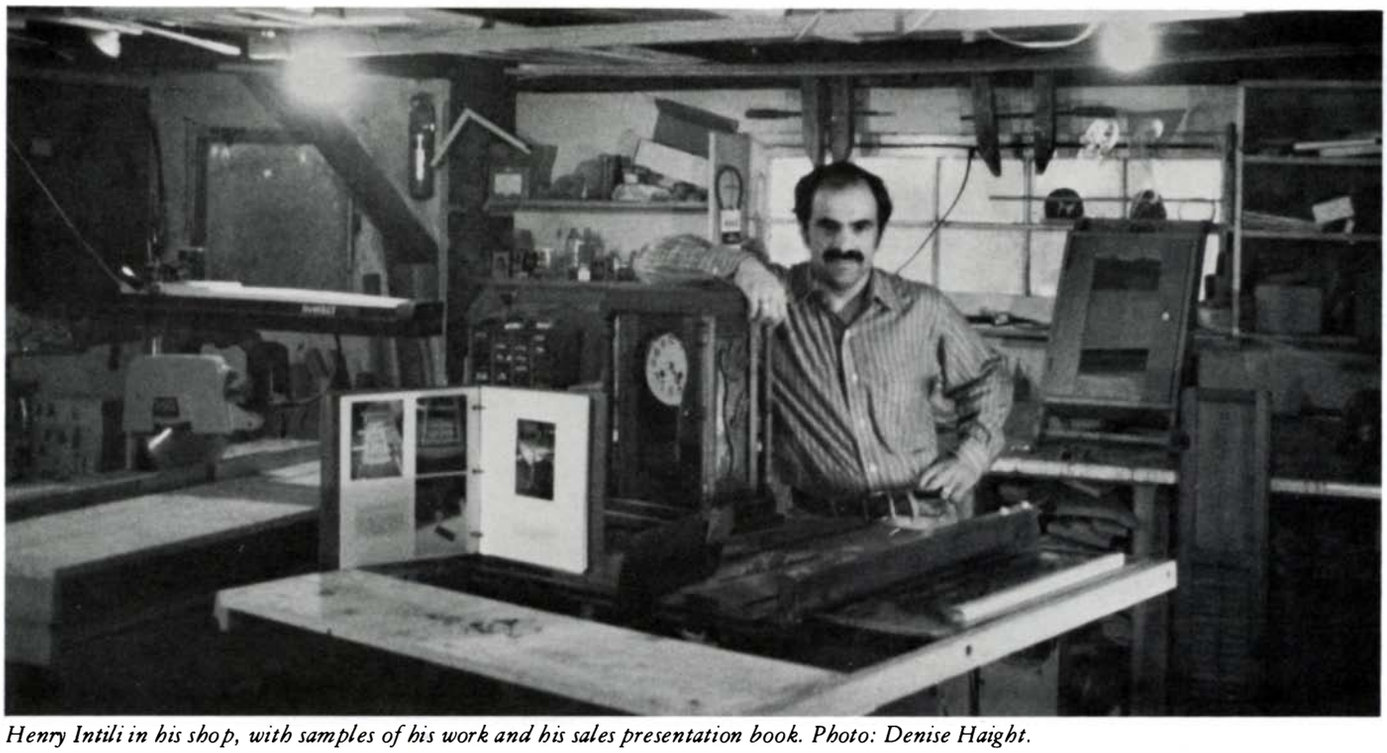
These suggestions are made to help bring the potential customer to you. Your objective is not to "sell" the person, but to present your benefits as an alternative to what he can purchase somewhere else. The more people who see, hear or read about what you have to offer, the greater are your chances to get an order.

Securing the order—You have attracted and interested a true potential customer, someone who wants a piece of furniture, has the money for it, and who can make the decision to buy. Now, how do you take an order?

First, establish your terms. We take one-third down with a drawing, and two-thirds upon delivery. We also provide an expected delivery date. Your terms should be written somewhere in your sales presentation book and should be clear to the customer. Make no exceptions.

Second, ask for the order. Don't shuffle your feet and wait for the customer to make the move. You are the seller, it's your product. Ask for the order, the customer won't bite you. The worst he can do is say no. That leaves you no poorer than you were when you started.

Fortunately, once a customer has come to the point of ordering, he usually says yes. And then you can get down to working wood.



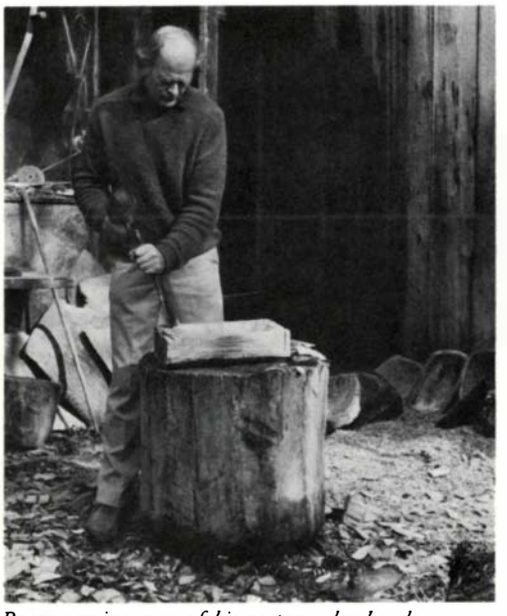
Henry Intili in his shop, with samples of his work and his sales presentation book. Photo: Denise Haight.

The Business of Woodworking

How I get by

by Dirk Rosse

It's hard to find your own path, but this is how it somehow works for me: I have several specialties. I make rough-carved and smoothly polished bowls in symmetrical and free-form shapes using various kinds of wood, and cutting boards which vary widely in shape, size and function. The cutting boards started as a way of using scrap lumber, but now any low-grade lumber of interest becomes cutting boards. Crotches or other interesting sections of trees go into my sculptural furniture or are stored to dry for future use, and of course the best lumber goes into my more conventional-style furniture. This is mostly tables, but also some cabinetry.



Rosse carving one of his rectangular bowls.

The raw material I work with costs me very little. Some of the trees I use come from our own land. Depending on their suitability, I have them sawed into lumber or I cut them into blocks for bowls. I collect any interesting wood that I can find, from standing trees to discarded wood at the town dump. Sometimes I get trees for removing them, and sometimes as a gift. Often I give the owner a piece of work made from his own tree. The tops of trees that the veneer people have left behind can make excellent material. When I have a specific need, I buy what I need at the going rate. It's hard to find good wood, so I examine each scrap carefully for one more use, often down to jewelry size, before burning it.

I work alone and mostly out of doors, even in the winter. I have a sheltered corner between the buildings where the sun comes in. My shop I use to store my tools and materials and to work in when the weather is worst. I'm up early every morning, and I try to work steadily.

I make few pieces of carved furniture because of the enormous amount of time involved and the resultant high price, which slows down sales. But I still enjoy making large pieces best. The more conventional furniture I also do in limited number. I work in cycles to keep my products diversified.

Whenever I get a suitable butternut tree I make carved bowls. I cut one slice at a time of the desired size, then rip it lengthwise through the heart of the log and square and shape the block, all using a chainsaw. I then hold the work on a large chopping block against two strips nailed there in an L-shape. Sometimes I use my foot to hold the wood. I rough out the inside of the bowl first. I use a portable circular saw or an electric chain saw to cut across the grain a few times and then I remove the center with a large gouge and a heavy, steel-core mallet. I carve the wood green. This way it cuts best, and it's about the only way you can find unchecked stock. The drying is done in a shed after the bowl is completed. When it's dry, I sand by hand with fine paper to preserve the chisel marks, and then I treat the wood with boiled linseed oil and turpentine. With a good straight tree I can make a dozen smaller bowls in a day, if all goes well. The smooth bowls are done much the same way, but with more disc-sanding and hand-finishing.

The shapes and sizes of the cutting boards depend mainly on the clear areas of the lumber. I use just about any local hardwood species, whatever wants to come my way. I don't use patterns, but rather freehand the shapes with a heavy pencil according to the wood and my fancy. After sawing I use rasps and spokeshaves to shape my boards, then I surface them with a disc sander and fine paper, which leaves an attractive, ripply texture. I finish them with boiled linseed.

I have always discouraged people from apprenticing with me or anybody else. I tell them to look all they want and to try if they like, but then to go home and work. It takes very little time for a person who knows what he's looking for to pick up a great many techniques and ideas. My advice is to visit as many woodworkers as possible, from those involved in industry to those in the smallest shop, but always to keep on working and producing.

I don't have anybody working for me, I just like to work alone. If I had helpers, I'd have too much to sell. When would I find time to work? I am involved with every thing I make, but to fall in love with your own creations and not be selling them is the best way to stagnation as a craftsman.

My main outlets have always been craft galleries. However, a specialty food store can be an excellent market for woodenware, and good furniture showrooms have done better for me than galleries in selling furniture. I have never advertised and I don't have a large sign by the road, but somehow everything I make eventually goes. I do find that an occasional craft fair helps to remind people that I still exist. Demonstrations are also good; in fact, any contact made can have long-term results. I'm not very good at taking orders, nor at serving the public, but we get by—as long as my wife continues to work as a kindergarten teacher, which provides for such luxuries as the children's schooling and an occasional vacation for us all. But we never intended to devote ourselves to woodworking as a business. For us it's a way of living quietly in the country. We like it. □

Dirk Rosse was born in the U.S., raised in Holland, and returned to this country as a young man. Since 1953, he's been making a living as a woodcarver and furnituremaker, working alone on his backroad place near Millbrook, N.Y. This article was drawn from a talk he gave last year to craft students at Parson's School of Design in New York.

Printer's Saw Rebuilt

Converting the Hammond Glider

by Stan Wellborn

The Hammond Trim-O-Saw, originally used for cutting lead type in newspaper composing rooms, becomes an accurate woodworking machine for mortising and precise cutting.

When Jim Haber, of Silver Spring, Md., set out to find a table saw that would be unfailingly accurate and precise, he was attracted by a cutoff saw in the graphic arts shop of the high school where he teaches. The machine was a Hammond Trim-O-Saw, widely used in the printing trade to cut slugs of metal type used to compose newspaper pages. Made by the Hammond Machine Co. in Kalamazoo, Mich., the saw is known in the printing business as a Hammond Glider. Its principal feature is a 22-in. by 21-in. cast-iron table that rolls on sliding ball-bearing supports. That feature made it superb in newspaper composing rooms, where exact dimensions were critical. In recent years, however, as printing establishments converted from "hot type" to photographic composition, the Hammond Glider became obsolete. Thousands of the machines have ended up in liquidator warehouses as junk. Hammond no longer manufactures the machine, and Haber notes that only some models can be modified in the way he suggests. On the other hand, even a stock Hammond Glider would be a valuable addition to most shops, especially as a second table saw for fine joinery.

Haber decided that the saw could be modified into a multipurpose machine that would be more accurate than any moderately priced saw available. These changes would be necessary:
—It would need a 10-in. blade (the saw normally takes a 7-in. blade that attaches to an unorthodox three-point arbor).
—The larger blade would then have to be able to be lowered beneath the table.
—It would need an accessory chuck that would take bits to cut slot mortises, plus an auxiliary mortising table.
—Some provision for angle-cutting with a miter attachment would have to be added. Haber's saw was designed to make only 90° cuts; some models include a mitering accessory.
—Provision would have to be made for rip rails and a rip fence, since the saw does not have such attachments.

Haber, an industrial-arts teacher and an experienced wood and metal worker, bought his used Hammond Glider for $300, and spent an additional $450 for modifications. Haber believes any woodworker can make the same conversion he did. But he cautions that the margin for error is extremely small, and some parts of the project must be entrusted to a skilled machinist.

Modifying the blade arbor—One of the key operations in redesigning the machine involves retooling the three-point arbor and adding a chuck to its other end for use as a slot mortiser. Again, Haber emphasizes that these modifications must be done in a machine shop. Only careful machining will avoid runout or wobble in the blade or chuck.

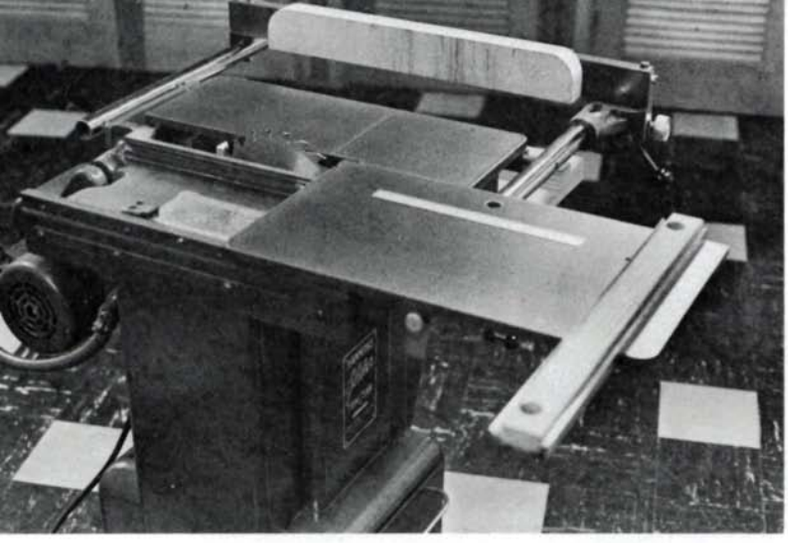
The arbor of the Hammond saw consists of a bored shaft with a blade-mounting head on its left-hand end, followed by spanner nuts that hold two bearings in position. Then there is a pulley for the drive belt, followed by yet another spanner nut. At the right-hand end is a space where many print shops attached a grinding wheel. A center bolt runs through the hollow arbor; it must be discarded.

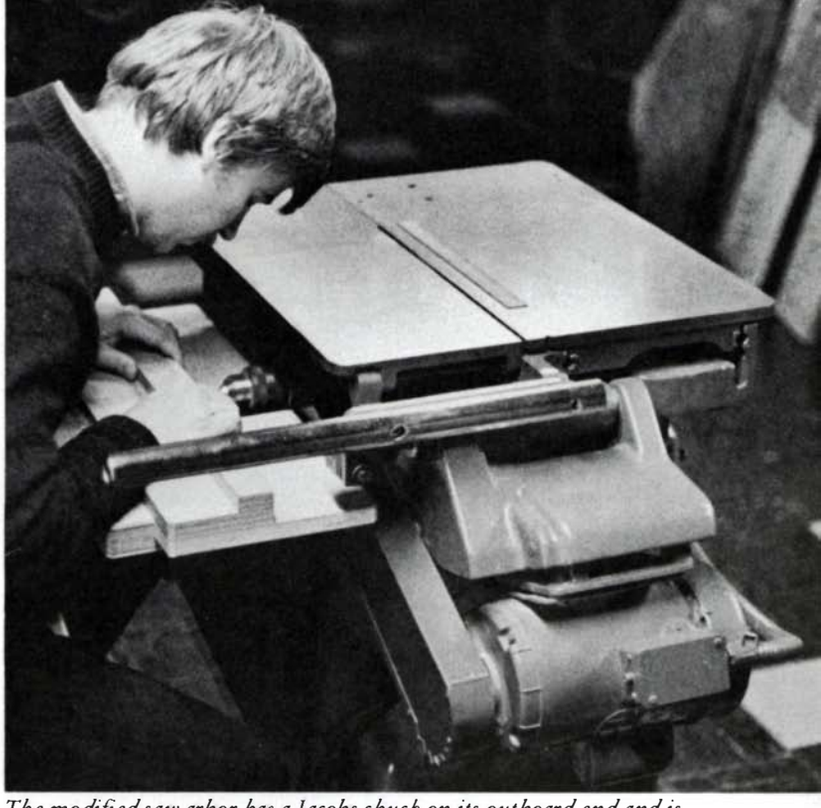
The blade-mounting head must also be removed, because the hole of a normal 10-in. blade will not fit on the mounting. The head is removed by taking out a steel pin, and the end of the shaft must be bored to accept a ⅝-in. rod that will be pressed into the arbor. After the shaft is bored by a machine shop, the rod is pressed into position and secured. Haber welded the rod into the shaft through the hole used to pin the original mounting head. It is important to use a steel that is similar to that of the shaft, so that the steels will be compatible and no unusual stresses will develop when the arbor is heated during welding. Your machinist may suggest an alternative for fastening the rod tightly in the shaft.

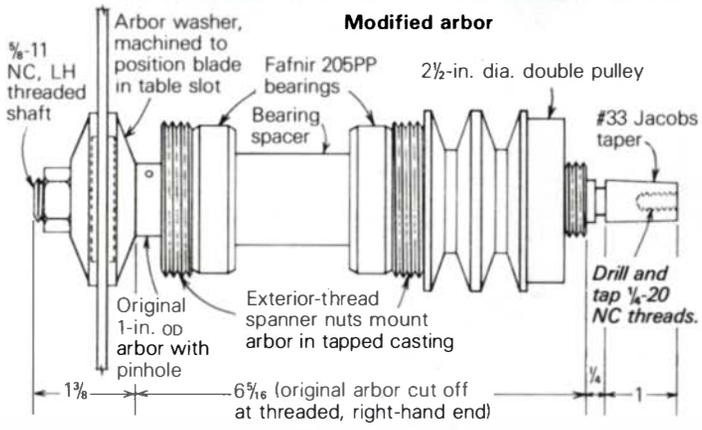
After the rod is welded into place, threads must be cut on the shaft end. The blade will be slipped over these threads and held by a nut. Haber used ⅝-in. 11-NC left-hand threads so the retaining nut will tighten against the blade as it cuts. He left part of the shaft unthreaded, so the hole in the blade would fit closely.

Providing blade clearance—At this point, the table itself must be unbolted from the machine and turned upside down. This makes it easier to cut spaces at three points in the iron castings beneath the table so that the blade can be fully recessed below the table surface. Be sure to maintain the position of the shims between the table and the stand. To mark the blade clearance spaces, rig up a mock sawblade from a piece of wood 5½ in. long mounted on a dowel. By swinging this around, it will be obvious what needs to be removed to allow room for a 10-in. sawblade.

In stock condition, the web of the main casting that holds the arbor head interferes with the threaded shaft that raises and lowers the blade, limiting a 10-in. blade from retracting below the surface of the table. To overcome this, cut away







The modified saw arbor has a Jacobs chuck on its outboard end and is used for slot mortising (above). The auxiliary steel and plywood mortising table is attached to the side of the saw cabinet. Equipped with Rockwell guide bars and fence (upper left), the saw can have a rip capacity of 48 in. The rolling table allows for extremely accurate crosscuts on boards up to 21 in. wide, and can be fitted with a tenoning jig or miter gauge for joining operations.

part of the web to achieve the necessary clearance. Haber drilled small holes on a line along the intended cuts, then he hacksawed along the pattern of holes. The cuts were then filed smooth. The next task was to increase the blade slot by grinding the right-hand table, again to allow the saw to take a 10-in. blade. Be sure the blade clears through its full range of vertical travel before starting the motor.

Replacing the motor—The Hammond Glider comes with a 3-phase, 220-volt motor. Haber substituted a single-phase, 110 to 220-volt, 2-HP capacitor-start motor, mounted via two existing holes in the motor-mount plate, plus two more holes drilled and tapped to fit. He then fitted a 4-in. motor pulley and two 42-in. belts, and refashioned the sheet-metal belt guard. The blade speed is approximately 4,200 RPM. The replacement motor cost approximately $150.

Adding a slot-mortising chuck—Haber added a slot mortiser by buying a drill arbor with a ⅝-in. straight shaft on one end and a #33 Jacobs taper on the other. The right-hand end of the saw arbor was bored to accept the ⅝-in. shaft, then the shaft was pressed and pinned in place. A heavy-duty Jacobs chuck was placed on the tapered end, and the end of the shaft was bored and tapped with ¼-20 thread. A cap screw could thus be driven through the throat of the chuck into the tapped hole to keep the chuck on the shaft.

Haber says the machining of the arbor and chuck for the slot mortiser is a critical operation because there's no margin for error. The machinist gets only one chance to get it right. Any mistake will result in too much wobble in the mortising bit, and it will be impossible to correct. Haber advises getting a machinist you can trust. The combined cost of the arbor modifications was approximately $100.

Making the mortising table—The support for the mortising table was made out of ⅛-in. cold-rolled steel and was attached to the body of the machine just below the mortising chuck. Small steel tabs were welded to the support through which bolts could be run to attach the support piece to the saw. On top of the support sits the mortising table itself, approximately 22 in. long by 12 in. wide, made of Baltic birch plywood. A sliding jig, mounted on the table, braces and positions the work. The stock is slid along the jig by hand, although Haber hopes eventually to devise a rack-and-pinion mechanism to drive the mortising table. The cost of the mortising table was $50.

At this point, Haber decided to add rails for a rip fence, using standard Rockwell parts. The procedure for doing this is too exacting to be described here, and Haber believes that most woodworkers would prefer to engineer their own rip attachments. He emphasizes that the woodworker should define the uses and functions he will require for the type of work he does, and modify the machine accordingly.

It should be noted that these saws have some disadvantages. Neither the arbor nor the table tilts, making bevel cuts impossible without jigs. The saw will not accept a dado head, although dadoes can be cut by making repeated passes over the blade. Table extensions for cutting large plywood panels cannot easily be added.

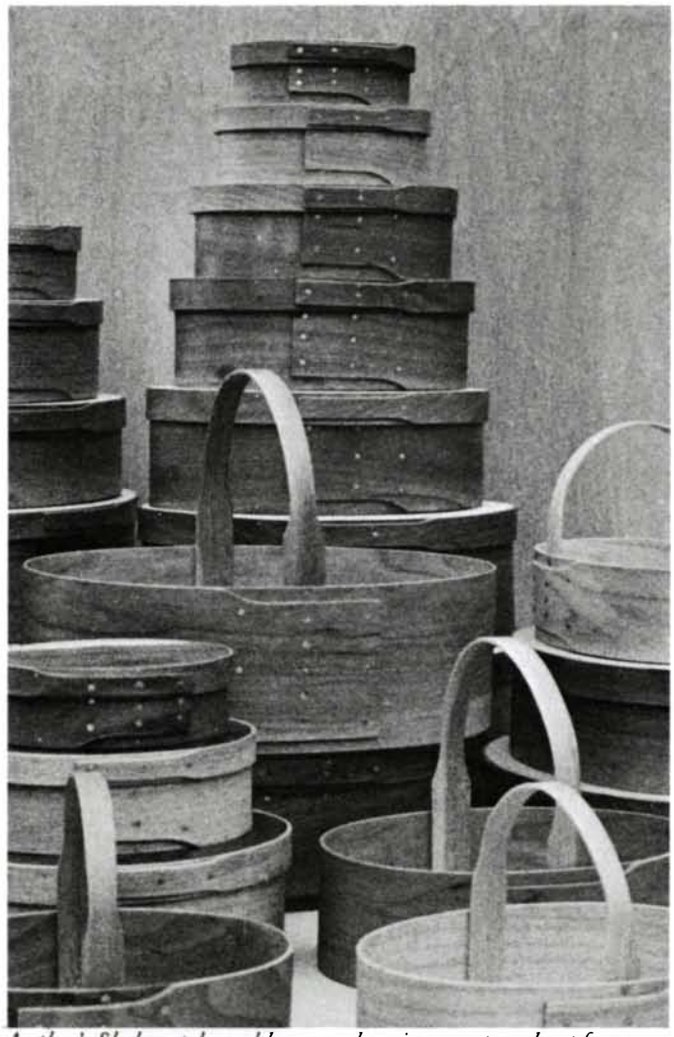
The principal advantage is extreme accuracy in an industrial machine that will probably outlive its owner. There's a removable crosscut bar pinned into the sliding table at a perfect 90°, and a clamping attachment for holding the tiniest piece of stock steady during the cut. The top of the bar is marked with the pica measurements used in the printing trade. A pica is about one-sixth of an inch, and the scale may prove useful for comparing a series of cuts. The crosscut travel is 21 in. Finally, the saw comes equipped with a roll-away bin that fits beneath the blade to catch sawdust. □

Stan Wellborn is a journalist and amateur woodworker, living in Washington, D.C. Photos by the author.

Oval Boxes

How to make steambent containers

by Tom McFadden



Author's Shaker-style oval boxes and carriers are steambent from various hardwoods, glued and nailed at the splice. Boxes nest one inside another. Below, rack of dowels inside steambox holds the stock, sawn and planed to about ⅛ in. thickness, on edge for a 15-minute soak in unpressurized steam.

I designed my oval boxes and carriers after studying Shaker examples. Typically, the sides of Shaker boxes were made of maple and splayed into three or more tapered fingers in the area of the scarf joint, where the two ends overlap. In my boxes the sides are of cherry, maple, madrone, mahogany, oak, ash or walnut, and I leave the outside overlapping end square, instead of cutting fingers on it. All these woods steambend easily in a thickness of ⅛ in. Before bending, the inside end involved in the scarf joint is tapered to produce a smooth surface when assembled. I fasten the joint with copper tacks and yellow glue, and attach the handles on carriers using the same. (The tacks are available from Fasco Fastener Co., 2023 Clement Ave., Alameda, Calif. 94501.) The pine tops and bottoms fit into the bent sides of the box and rim, and I secure them with round-head brass brads. The completed pieces are finished with two coats of polyurethane followed by an application of paste wax. I make the boxes in seven sizes and the carriers in five sizes.

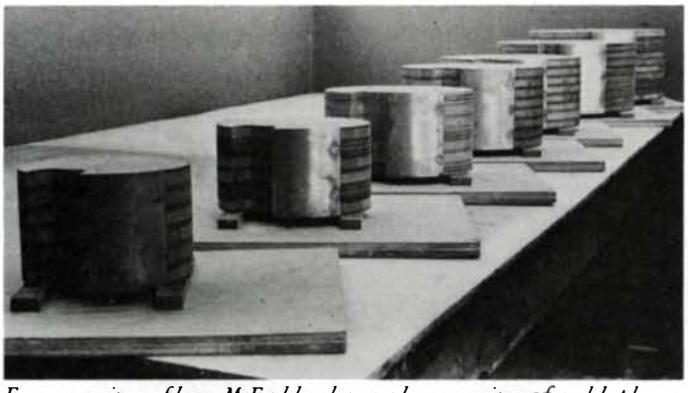
When selecting stock for bentwood boxes, you should use only straight, even-grained wood for the side pieces. Imperfections such as curl, knots (sound or otherwise) or slanting grain may cause the pieces to break or to bend unevenly. You can use kiln-dried stock, but lumber that has been air-dried to 10% or 12% moisture content will respond to the steam more readily and produce more consistent results. Resawn, a good 4/4 board will yield three side pieces.

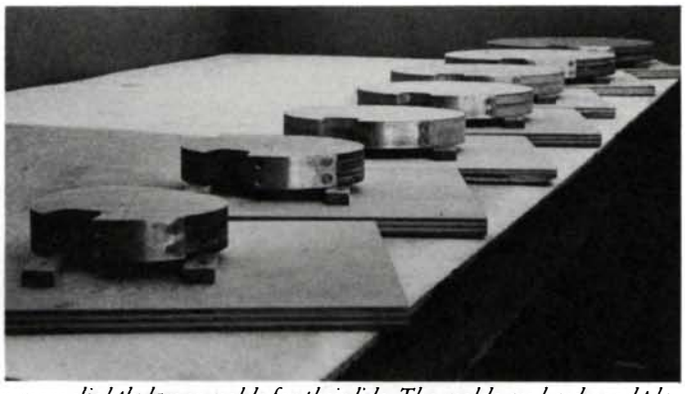
Before resawing, crosscut each board to within 3 in. or 4 in. of its finished length; then joint one face and edge, and plane the unjointed face. Now rip the boards to width, then resaw and plane them to produce blanks ⅛ in. thick. Take ten of the ⅛-in. blanks, align and stack them one atop another and tape them together with masking tape. Mark out the narrow part of the outside end of the scarf joint and the location of the tacks by laying a pattern on top of the bundle. The ends of the pieces can now be stack-sawn to shape and the 1/16-in. dia. pilot holes drilled for the copper tacks. Smooth the end-grain edges with a stationary belt or disc sander.

Next separate the pieces and with a hand plane taper the inside end of each overlap down to 1/64 in. over the last 6 in. After tapering, sand each side piece inside and out with a 100-grit belt in a belt sander, and round the edges by hand slightly with 120-grit paper. Mark the inside of each piece with a pencil so you'll know which way to bend it after it comes out of the steam box. The completed side pieces are again taped into bundles to await steaming.

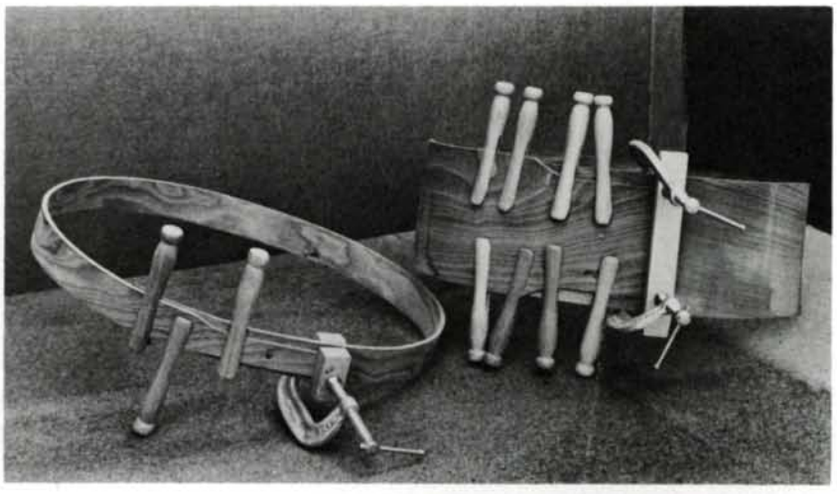
I made the bending forms for the boxes and their tops from stacked ¾-in. hardwood plywood, sanded and varnished to facilitate removing the completed side pieces. I use hardwood plywood for the forms because of its stability in the

Tom McFadden, a woodworker by trade, lives near Navarro, Calif. Photos by the author.

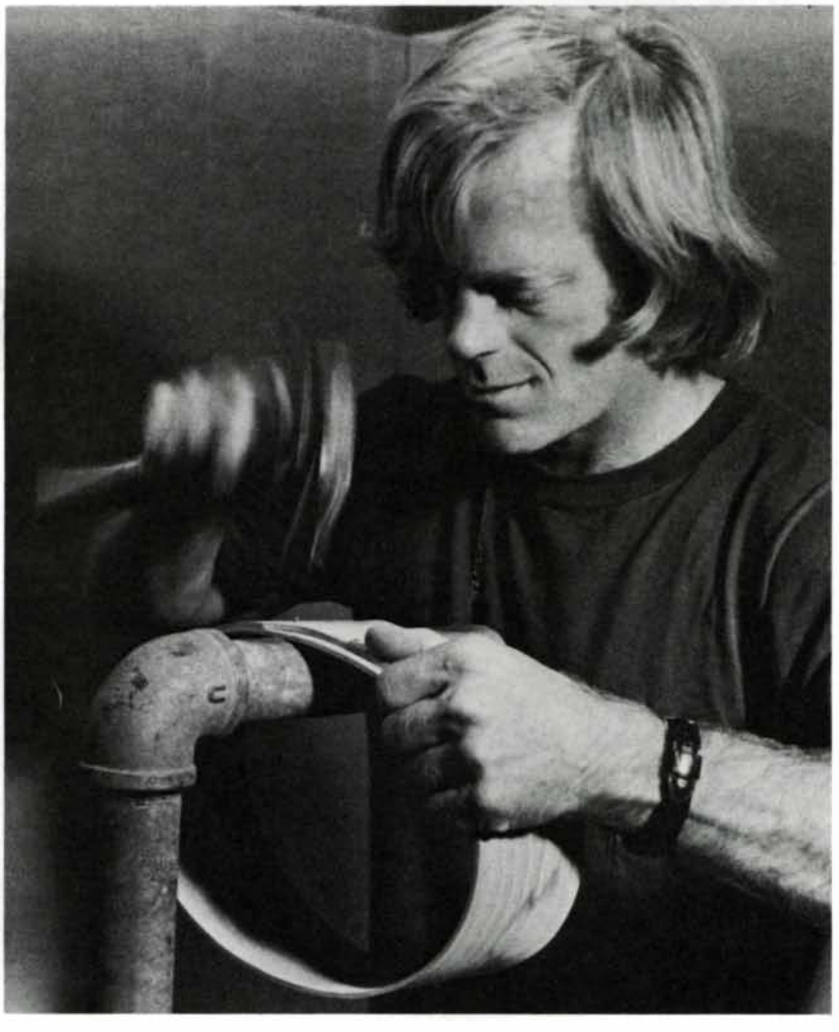


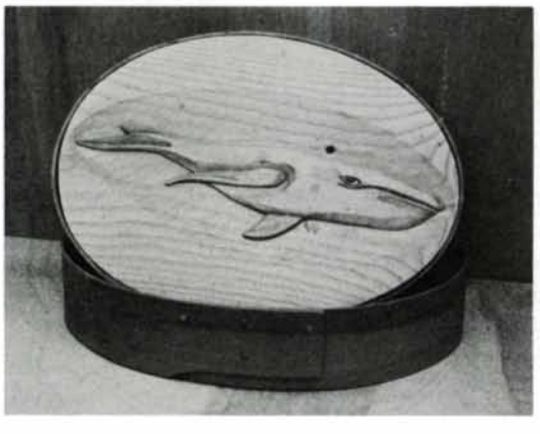


For seven sizes of box, McFadden has made seven sizes of mold, plus seven more slightly larger molds for their lids. The molds are hardwood plywood, sanded smooth and varnished. Stainless-steel plate let into each mold is an anvil against which first row of tacks may be clinched.



After steaming, box sides are wrapped around the bending form and clamped in place, above. The clamp shown here was made by welding two steel bars to the jaws of a Visegrip pliers. When the piece has cooled enough to retain its shape, the scarf joint is glued and minimally nailed, then clamped with C-clamps and clothespins, upper right, until the glue has dried. At right, author drives and clinches the remaining nails against an anvil made from 1½-in. galvanized pipe. Below, one of McFadden's boxes, with carved lid.

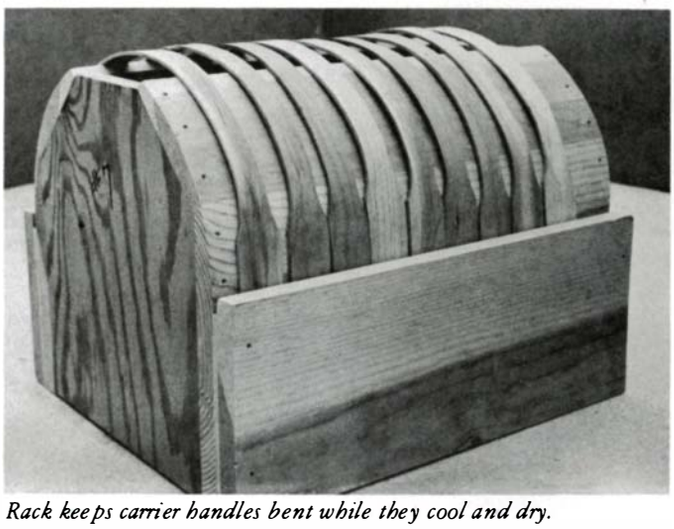




face of temperature and humidity changes. Each form is fitted with a stainless-steel plate in the area of the scarf joint that lets me drive tacks through the wood without damaging the form. Stainless steel is used to ensure against staining the steamed wood. The plate is let flush into the surface of the form and attached with stainless-steel screws. At one end of the plate the form is notched to accept an adapted Visegrip which clamps the steamed sides in place while they cool and are glued and riveted with the tacks. Further, each form is mounted on a plywood base plate which fits interchangeably into a frame screwed onto a table. Two cleats hold the form ½ in. above the base plates so that the completed sides can be easily gripped from below and slid upward off the form.

The side pieces are placed in the steam box and subjected to unpressurized steam for 15 minutes. After steaming, quickly remove each piece from the box, wrap it tightly around the form and clamp it with the adapted Visegrip. After the piece has cooled enough for its shape to set, remove it from the form. Apply glue to the scarf joint and then reclamp it on the form for tacking. Only the center vertical row of tacks is driven at this time; these will fix the size of the oval and will hold the overlap in place while the side is removed from the form and the overlap is clamped with C-clamps and clothespins. Drive the remaining two rows of tacks after the glue has dried. The points of the first row of tacks are turned over and mushroomed against the stainless plate in the bending form; the remaining tacks are hammered in against an anvil made from 1½-in. galvanized pipe. The finished side pieces are hand-sanded with 120-grit paper to remove the raised grain caused by the steaming.

Handles for the carriers are resawn and shaped in the same manner as the side pieces. They are steamed and bent around



Rack keeps carrier handles bent while they cool and dry.

a form, then placed in a drying rack until they are attached to the sides with glue and copper tacks.

Cut the tops and bottoms from pine (quartersawn is best) with a moisture content of 6% to 7%. It is essential that this material be very dry or it will shrink away from the side pieces and leave ugly gaps. Place the side piece for the box on the pine bottom, trace the inside shape and bandsaw along the line. Make final adjustments in the fit with a disc sander. Round the edges of the pieces slightly, and sand them. Use dividers to mark the location of the brass brads that will hold the top and the bottom in place. Then drill the pilot holes through the side pieces, and drive the brads. □

Shaker Carrier

Dovetail box, steambend handle

by John Kassay

This not-so-difficult-looking project offers two challenges—the hand-cut, through-dovetail corners and the sculptured, steam-bent bail (handle). Carrier is the Shaker name for a box fitted with a bail. Those carriers that exhibit pleasing form, fine construction, and quality craftsmanship were made for the Shakers' own use, whereas carriers made for sale in Shaker stores, though well crafted, look mass produced. With the exception of the manner in which the bail is fastened, this carrier is a fine example of one made for communal use.

To make the carrier, thickness-plane enough pine (wood species is optional) to make the sides (A), ends (B) and bottom (C). All surfaces should be hand-scraped and sanded. Those surfaces that will be on the inside of the carrier should be finished surfaces and so marked. Now lay out the sides and ends and add 1/32 in. to their widths and lengths, and cut accordingly. The extra length allows the ends of the dovetails to project minutely beyond the outside surfaces. After the sides and ends are assembled, these projections are planed or sanded off, resulting in a better appearing dovetail joint. The extra width is used for truing up the edges at the top and bottom of the carrier, again after assembly.

Mark out and cut the bottom ¼ in. longer and wider than the overall length and width of the carrier sides and ends. Sand the inside surface and shape the upper edges as shown in the drawing. Nail the bottom in place—a nice touch here would be to use ⅞-in. fine-cut headless brads (available from Woodcraft, 313 Montvale Ave., Woburn, Mass. 01888).

Nailing the bottom onto the carrier sides may seem to contradict all we have been taught about wood movement, but it is the way the Shakers did it—and they had central heating too. It has been suggested that the bottom ought to be let into a groove in the sides, like a frame-and-panel. However, I have rarely seen good results from altering a Shaker design. In this particular case, inletting the bottom would eliminate a characteristic Shaker form, the molding created by the protruding bottom, and it would greatly complicate the carrier's joinery. I think that when the bottom worked loose, the Shakers would just nail it on again.

The bail is made of ash; red or white oak or hickory could be used instead. Mill straight-grained stock to overall thickness, width and length (detail 2), then steam it and bend it around a mold before tapering it to shape. Although it's difficult to shape the bail after bending, it's more frustrating to lose a pre-shaped bail during the bending process.

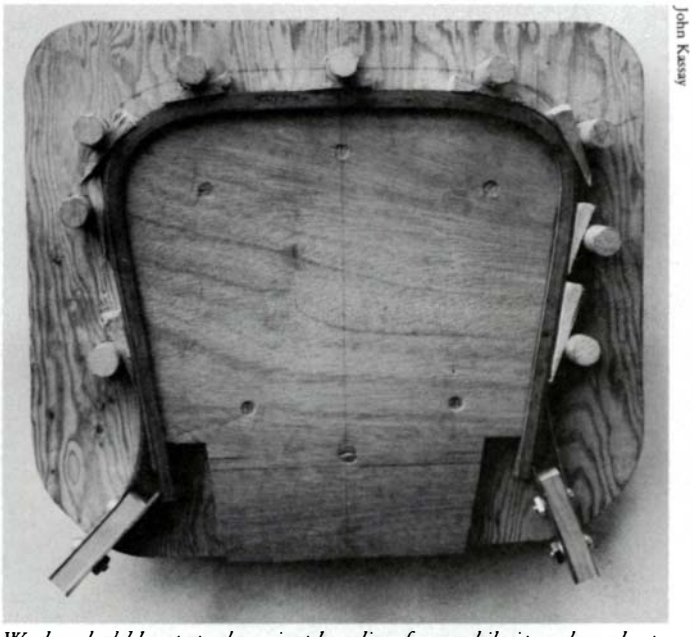
The photo on the facing page shows my bending jig, with a back-strap made of four strips of 24-gauge galvanized sheet steel, spot-welded together at the center *(FWW* #8, Fall '77, p. 40, and #30, Sept. '81, p. 84). This apparatus will bend

John Kassay is the author of The Book of Shaker Furniture, *available for $40 from University of Massachusetts Press, Box 429, Amherst, Mass. 01004.*

kiln-dried white oak that's been steamed for about two hours under low pressure (5 PSI to 10 PSI). If you use split-out green wood, the chance of a successful bend is greatly increased; you can probably substitute an ordinary band clamp for the steel back-up strap and end blocks. I leave the bent stock on the jig to set for a couple of days. When removed, it springs back just the right amount to fit the carrier.

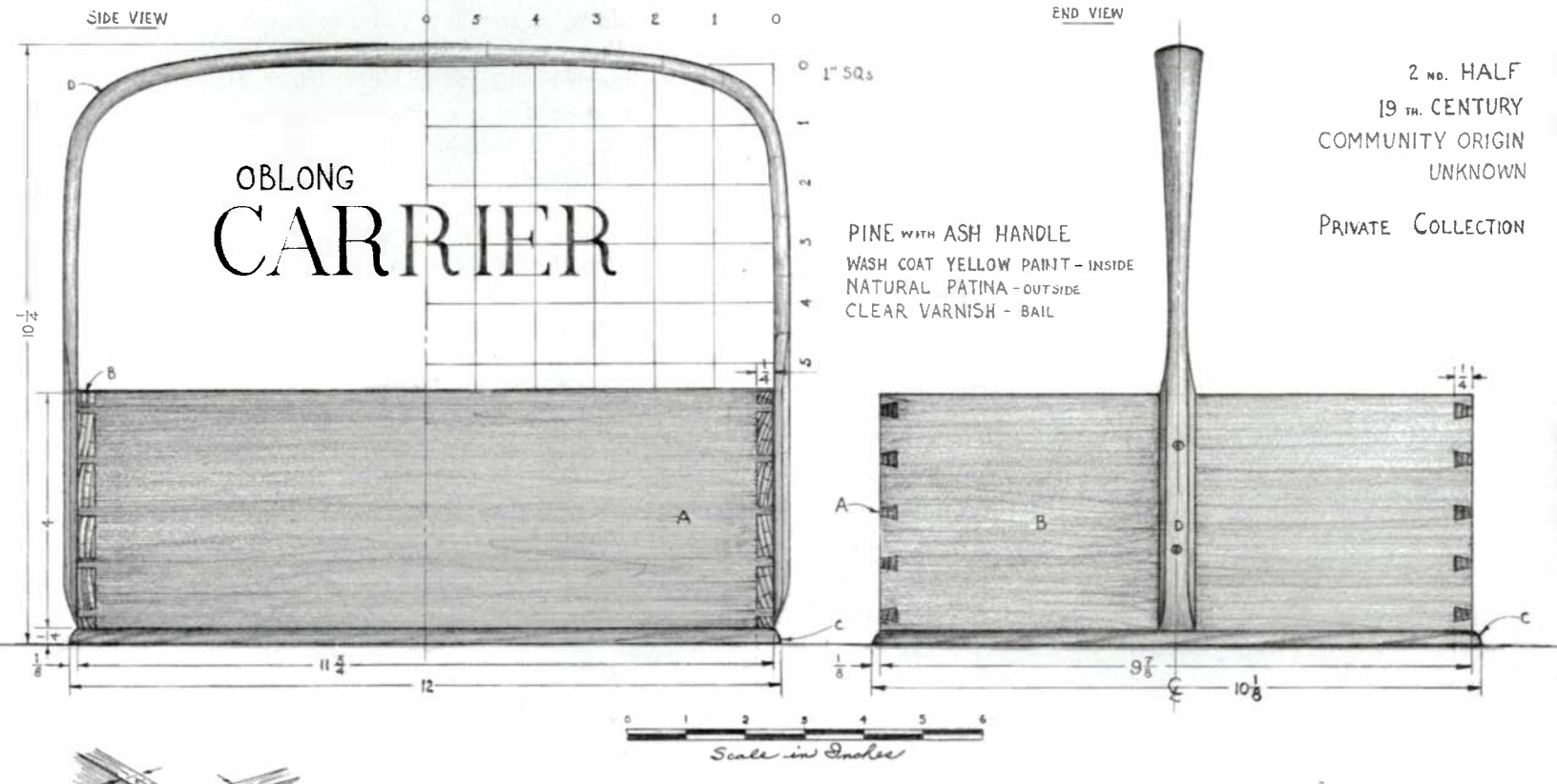
Now make a full-size pattern of half the length of the bail, trace it onto the bent wood and cut out the shape. With a block plane and a scraper blade, taper the bail in thickness from the center to the ends, as shown in the edge view, then spokeshave it to the cross-sections shown. Note that the undersurface is rounded, while the outer surface is left flat. Both ends of the bail are flat where they attach to the carrier ends, and chamfered on their outer corners. Fine-sand all the surfaces and ease any sharp corners, except those where the bail meets the carrier. Fasten the bail with four brass rivets and washers, two at each end; you could substitute countersunk flat-head woodscrews.

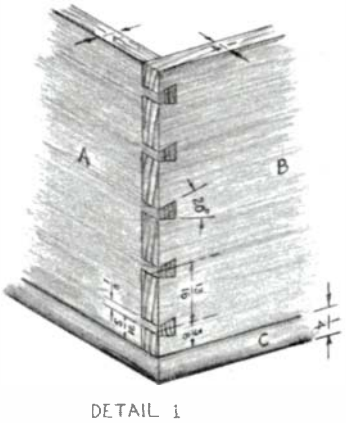
The inside surface of the original carrier was protected with a wash coat of yellow milk-paint, while the outside was left natural. The bail was varnished. □



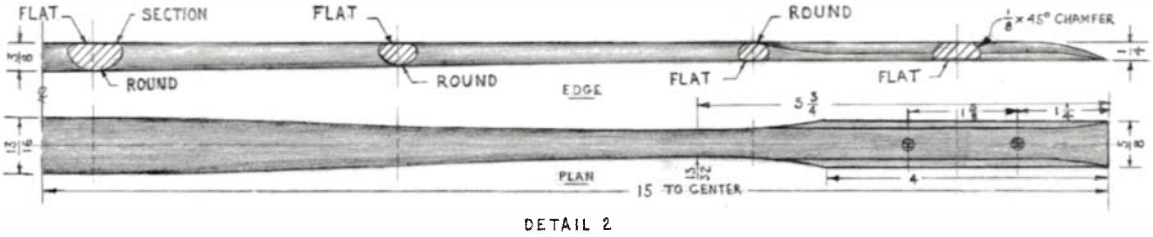
John Kassay

Wedges hold bent stock against bending form while it cools and sets. Steel back-up strap with end blocks helps make the bend, but once bent, the strap can be tipped away from the stock, as shown.





DETAIL 1
CORNER DOVETAILS



DETAIL 2
LAYOUT OF BAIL

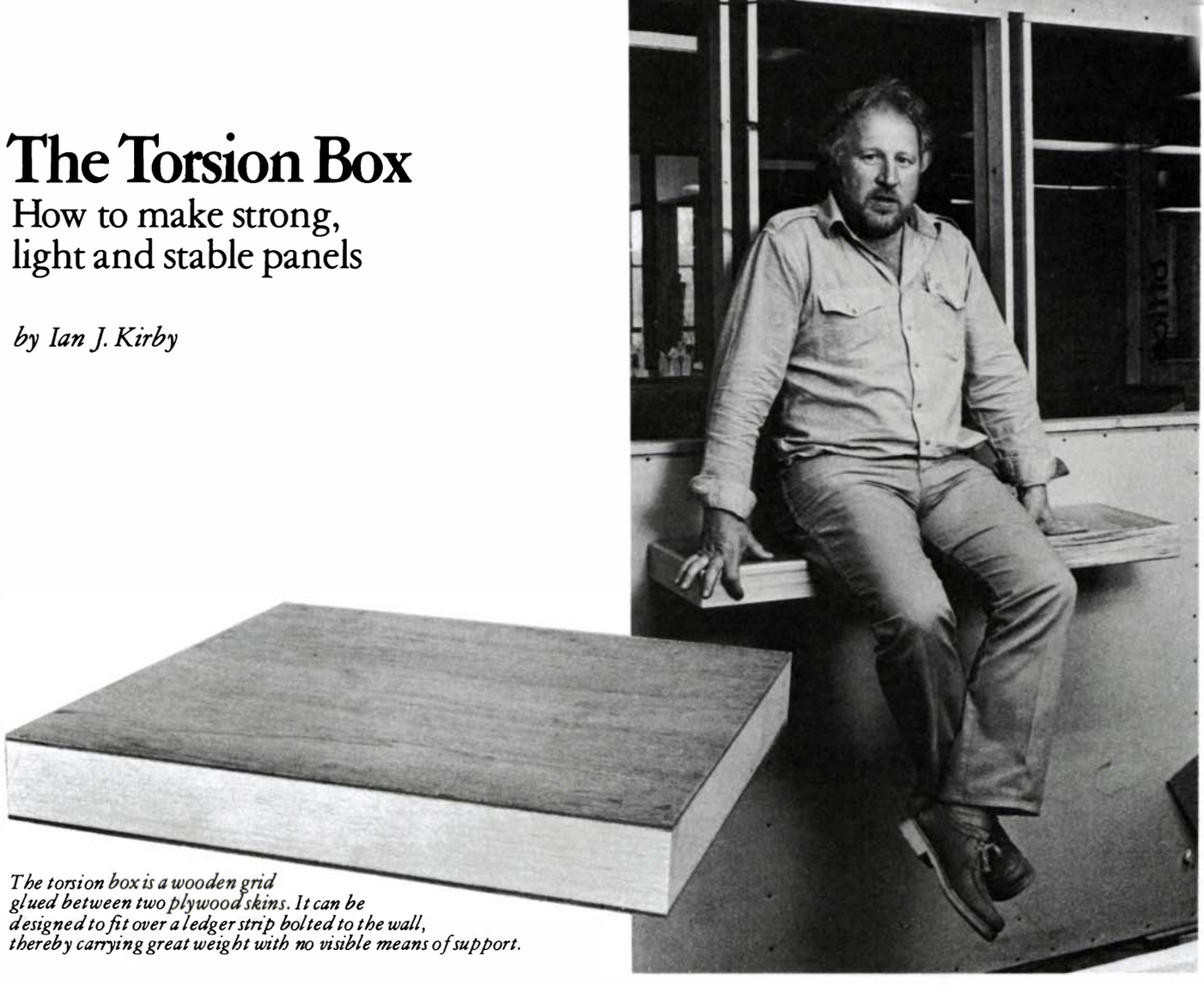
MEASURED & DRAWN by
John Kassay

Scale in Inches
all details

The Torsion Box

How to make strong, light and stable panels

by Ian J. Kirby



The torsion box is a wooden grid glued between two plywood skins. It can be designed to fit over a ledger strip bolted to the wall, thereby carrying great weight with no visible means of support.

Suppose you wanted to make a low bench about 18 in. wide and 4 ft. long, cantilevered out from a wall with no supporting structure underneath. In solid wood, you'd have to use a plank 2 in. thick or thicker, so this simple bench would consume at least 12 bd. ft. of wood, and it would weigh 40 lb. or more. Then you'd have the devil's own tussle figuring out how to hang it on the wall.

If you used a torsion box, you could make the same bench from less than 3 bd. ft. of wood and 12 sq. ft. of ¼-in. plywood. It could be any thickness you wanted, it would weigh about 10 lb., and it would be child's play to cantilever it from the wall. The torsion box is especially suitable for building high-quality veneered furniture, because it's both lighter and more stable than a conventional lumbercore structure. It's probably the simplest way to make a curved panel, and the ease with which the designer can manipulate the thickness dimension is truly liberating. At the same time, the torsion-box system is well within the technical reach of the amateur craftsman and the small professional shop.

As used in furnituremaking, the torsion box is two thin skins of plywood glued to a core grid of thin wooden strips. The resulting structure has strength not present in either the skin or the core alone—it's strong the same way an airplane wing is strong. In particular, a torsion box has tremendous resistance to twisting and bending forces. This is because the structure's geometry converts any applied force into shearing stress on the glue lines between skin and core grid. And a sound glue line is strongest in its resistance to shearing stress.

The concept behind the torsion box isn't new. Engineers use it for box beams as well as for airplane wings, and the same concept makes possible the structural steel I-beam. The system described here was developed in Europe during the 1960s for the manufacture of large wardrobes and other case goods for storage. The traditional way of making a wardrobe is to join four pieces of wood at the corners, firmly attach a back, and hang doors on the front. Although the back contributes a great deal to rigidity, the front corner of a 6-ft. wardrobe can still be lifted several inches off the floor with the other three legs remaining on the ground. Any unevenness in the floor will thus twist the case, jamming its doors and drawers. If a torsion box is used to make the back or sides, they will be absolutely rigid, and the rest of the wardrobe, if firmly attached to the torsion box, will also be rigid. The furniture industry hasn't made much use of the system, even though its applications extend far beyond keeping wardrobes free from twist. It can be used in practically every furniture form—storage cases, shelving units, tables, beds and all forms of seating, upholstered or not.

The torsion box is not a shoddy alternative to solid wood. It opens up design possibilities that simply cannot be achieved in solid wood. In the solid, you can usually find a board that's long enough, and the width can be glued up, but the thickness dimension is pretty much limited by weight and commercial availability to 2 in. or less, and you cannot eliminate wood movement. In terms of workmanship, the torsion box is fully as demanding as working in solid, and the result can be furniture of the highest quality. In fact, making a torsion box

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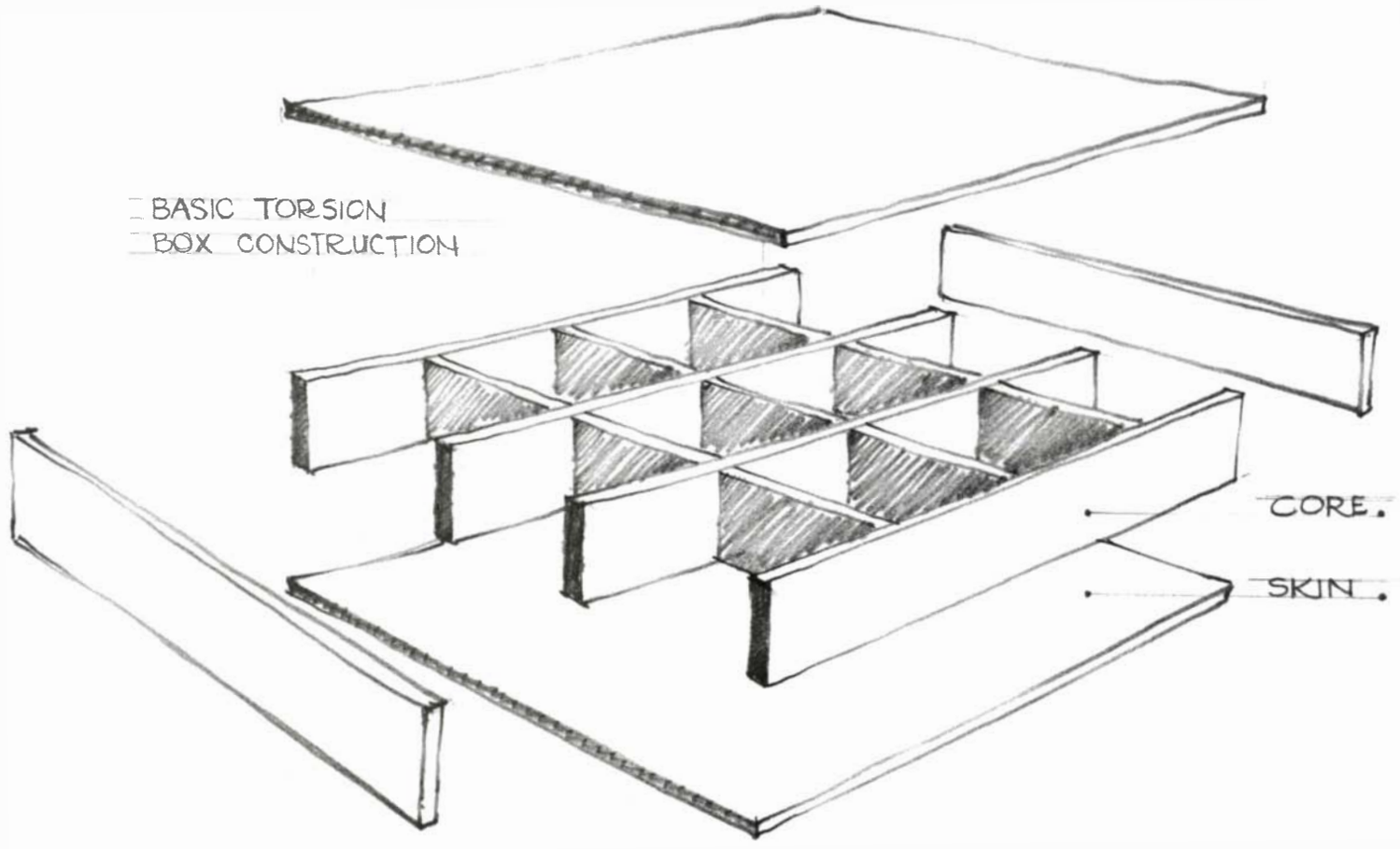
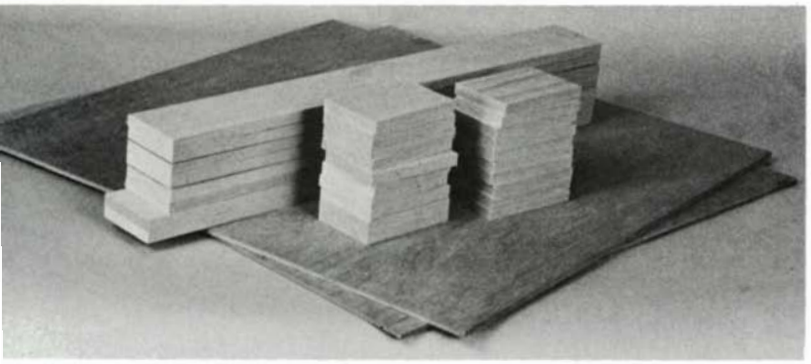
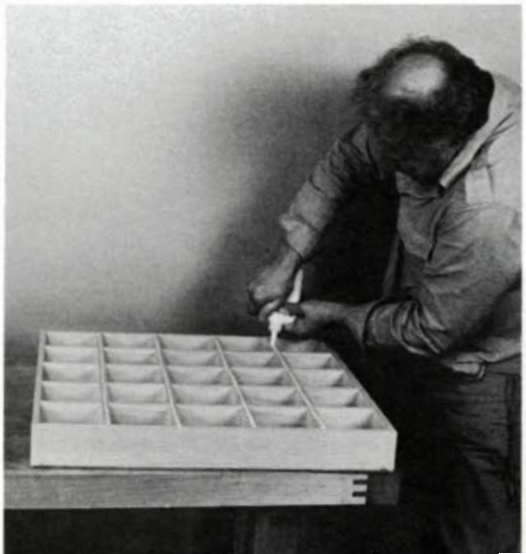
Consulting editor Ian Kirby teaches woodworking and furniture design at Kirby Studios in North Bennington, Vt.

Drawings: Ian J. Kirby





Here is the basic method for making a torsion box. Prepare stock for the skins and core (above), in this example ¼-in. plywood and clear pine sawn ⅜ in. thick by 2½ in. wide. Ordinary staples hold the core together until the skins can be glued on. Start with the outside pieces (right), and the long strips, then fill in the grid (below, left). Run a bead of white or yellow glue on one side of the grid (below, center), roll it out well, and carefully position the skin. Then flip the box over on top of the bench and clamp it down, using curved cauls to distribute the pressure (below, right). Unless you are using a veneer press, it's unwise to glue both skins at once.



requires more thorough planning than working in solid wood, for once you've glued up the box, you cannot change your mind and trim a half-inch off. There's no room here for inadequate design planning or for sloppy workmanship—quite the opposite.

A sample panel—The photo sequence on p. 97 and the following discussion are based on making a sample panel that's 2 ft. square and 3 in. thick, using ¼-in. veneered plywood for the skins and ⅜-in. by 2½-in. softwood for the core. The panel might be for a tabletop or for a shelf—it doesn't matter. The point is to establish the working principles involved. Once you understand the system, you'll see that the core grid and the resulting box can be virtually any shape you want, according to what your design requires. Later on I'll discuss surface and edge treatments, ways of joining two boxes together, and how to attach a torsion-box structure to a wall.

For the core we should use wood of practically any clear species, from poplar to maple, even pine, at 6% to 8% moisture content. But don't mix species in any one core. Differences in shrinkage can make the panel wavy. The thickness of each strip is as much a function of handling as of anything else. We could cut it down to ⅛ in. thick and build the grid on 2-in. centers, but we'd waste a lot of wood in sawdust. We'd also have trouble keeping the 24-in. long strips straight in one direction, and even more trouble handling 121 bits of wood, each 1⅞ in. long and 2½ in. wide, in the other direction. Even so, we could make a 4 sq. ft. core grid from 1½ bd. ft. of stock (not counting kerf losses), the 2-in. spacing would be enough to keep the plywood skin from sagging into the voids in the grid, and there would be about 78 sq. in. of gluing surface on each side—the panel would be plenty strong. If we make the core stock ⅜ in. thick, the strips won't be as numerous or as flexible. Spaced just over 4¼ in. apart, we'll have a 2-ft. square that still consumes less than 2 bd. ft. of material. There'll be 108 sq. in. of glue surface on each side, more than enough. At this point in the analysis we might decide that the grid spacing is too great for ¼-in. plywood, especially if it is to be veneered and used for a table. To keep the skin from dishing into the core voids, we could add a couple of core strips, or use ⅜-in. plywood for the skin instead. There is no hard rule—you decide according to the materials and the ultimate use of the box.

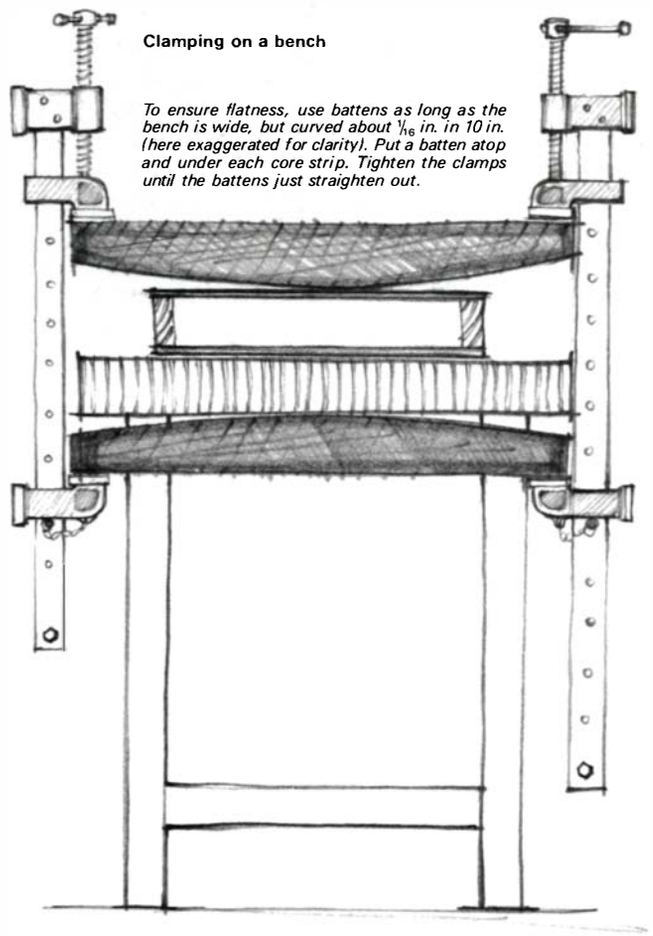
Whatever dimensions you choose, all the core material must be accurately prepared: it must be flat, uniformly thick, and cut off squarely. Both the width and the thickness can be got with a carbide-tipped saw, but it's better done through the thickness planer. Both skins should be made the same size, with their corners truly square, to the finished dimensions of the panel. The core grid, on the other hand, should be made a trifle large, say 1/16 in. over in length and width. Then after assembly it can be planed to meet the skin exactly.

If the finished box is to be veneered, the veneer should be glued onto the skins before they are cut to size. It's bad practice to veneer the assembled box, because the pressure of the press will tend to force the glue away from the core grid, making it puddle up over the voids. The box might end up looking like a lumpy checkerboard.

Joining the core grid—There are no joints in the core grid. The pieces are simply stapled together across the joint lines, top and bottom. Start by stapling together the four outside pieces, then run all the long strips in one direction, using crosspieces as spacers. Hold each piece firmly in place and staple. When all the long strips are stapled on one side, turn the grid over and staple the other side. Then fill in with the crosspieces. It's natural to imagine that staples can't possibly hold this thing together, that some joint must be necessary. Actually, the staples don't hold anything together. They merely stabilize the grid so it can be handled until the core can be glued onto it. The glueline between core grid and skin is what holds the box together. You would have to apply enough force to shear all that gluing surface before any core joinery would come into play.

Having now got the two skins cut to size and the core assembled, the next step is to put the three parts together. Any normal wood glue will do the job; I find it easiest to squeeze white or yellow glue along all the core edges, then to spread it out with a 1-in. paint roller. It is important to wet the entire surface of the core grid, since the skin goes onto it dry. Plant the skin on the core, register one long edge, then align an adjacent edge. If the core seems out of line, pull it into place using the skin as a try-square. Once one corner of the assembly is aligned, the rest of it will be aligned too. You can drive a couple of veneer pins or small brads through the skin into the core to hold it in place. Clamp or press the skin onto the core until the glue cures, then turn the box over and glue the second skin in place, being sure to work from the same edge and corner you aligned on the first side.

A veneer press is the ideal tool for gluing up the box, not because of the pressure it can exert, but because its bed is flat. In whatever shape you hold the torsion box while the glue is drying, that will be its final shape. If it is twisted while it cures, it will stay twisted forever. The veneer press also makes



Clamping on a bench

To ensure flatness, use battens as long as the bench is wide, but curved about 1/16 in. in 10 in. (here exaggerated for clarity). Put a batten atop and under each core strip. Tighten the clamps until the battens just straighten out.

it practical to glue both skins onto the core at one pressing.

The best alternative to a veneer press is the top of your bench, but check it for flatness before you spread any glue. You can clamp the core to the panel (panel flat on the bench top) with standard quick-set clamps, as shown on p. 97. Use cambered battens to distribute the pressure. Be sure the clamps themselves don't twist the bench top; don't, for example, anchor clamps to the bench's understructure. The appropriate method is determined by the availability of a press or of clamps and a flat surface, and by the geometry of the workpiece. The important thing is to understand what has to be achieved and to respond accordingly.

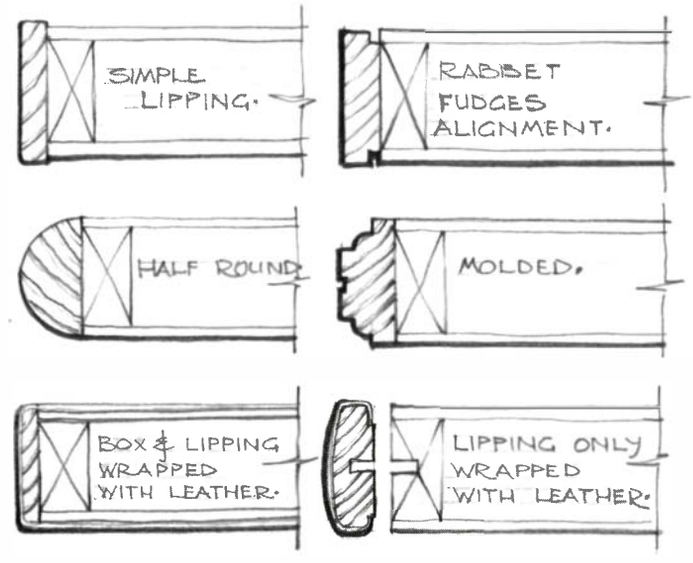
When the glue has cured, unclamp the assembly, clean off the glue squeeze and plane the core to the size of the skins. To assess the strength of the box you've just made, clamp one edge in the vise, grab the top corners and try to twist it.

What we've done up to this point is make the basic building brick of the torsion-box system. In order to use the system we must consider how to join two or more boxes together, and how to finish their surfaces and edges. These considerations are part of the design process, not afterthoughts, for most joining methods require some provision in the construction of the core. When you understand the system, the possibilities are limited only by your ingenuity.

Surfaces and edges—The torsion box is well-suited to the application of quality veneers and to the quality cabinetmaking techniques that go with veneering. As I mentioned earlier, it's best to veneer plywood skins before you assemble the box. There is nothing wrong with using pre-veneered plywood—the only drawback is that your choice of veneers is restricted. Applying your own veneers gives you easy access to the ebonies and rosewoods and other exotic species that can no longer be had in solid wood. I'll discuss veneering techniques in future articles.

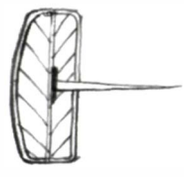
Whether you apply your own veneer or use pre-veneered plywood, the edge of the torsion box needs to be finished. The most direct solution is to glue a solid wood lipping to the core, of the same species as the veneer or some contrasting species. Mitered corners always look good. If the lipping is to be flush with the surface of the box, it can be registered with a spline or a Lamello, or else it can be milled a little wide and planed flush after assembly. If the lipping must bear a load, a hinged door for example, it should be reinforced with a spline or tongue-and-groove. Grooves can be milled directly into the core of the box, and tongues onto the lipping stock. Of course the lipping can be shaped to virtually any profile. When the surface is an exotic veneer, you can make lipping stock by gluing three or four veneers together.

With the torsion box system, there is no reason to confine your design universe to wood. The stability of the skin allows you to cover it with virtually any sheet material. Thus you can develop your design with the colors, textures and properties of paint, leather, Naugahyde, cloth, Formica, ceramic tile, slate, metal tile or even sheet metal. There are special adhesives available for most of these materials. Tiles can be laid with adhesive and grouted. A traditional way to attach sheet copper is with decorative nails. Leather and Naugahyde are best stuck down with white glue. *(continued, next page)*

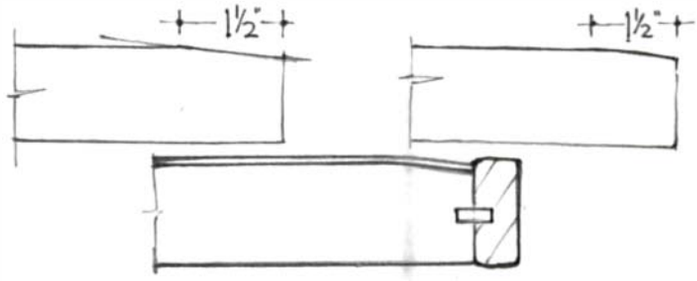


Rich Lippings

When the box is veneered, a leather-covered lipping will be quite rich in look and feel. An upholsterer would make up lipping stock by driving nails through one strip of wood, then gluing a second strip atop the nailheads to capture them. Trim this sandwich to width, profile its edges, glue the leather around it and then hammer it into position.



When the box is covered in leather or Naugahyde, neatly wrapping the corners can be most difficult. You can avoid the grief if you trim the leather exactly flush with the edge of the box, then glue on a solid wood lipping whose width is the thickness of the box plus surface material or even slightly wider, so it stands proud of the surface. The job will be especially rich if you make the lipping as wide as the panel is thick without surface material, then plane the panel's top edge down by the thickness of the leather or Naugahyde. This planed margin should be about 1½ in. wide; it can be planed flat or round as shown. Glue on the surface material, trim it back flush, and use a spline to locate the lipping flush with the leather surface.



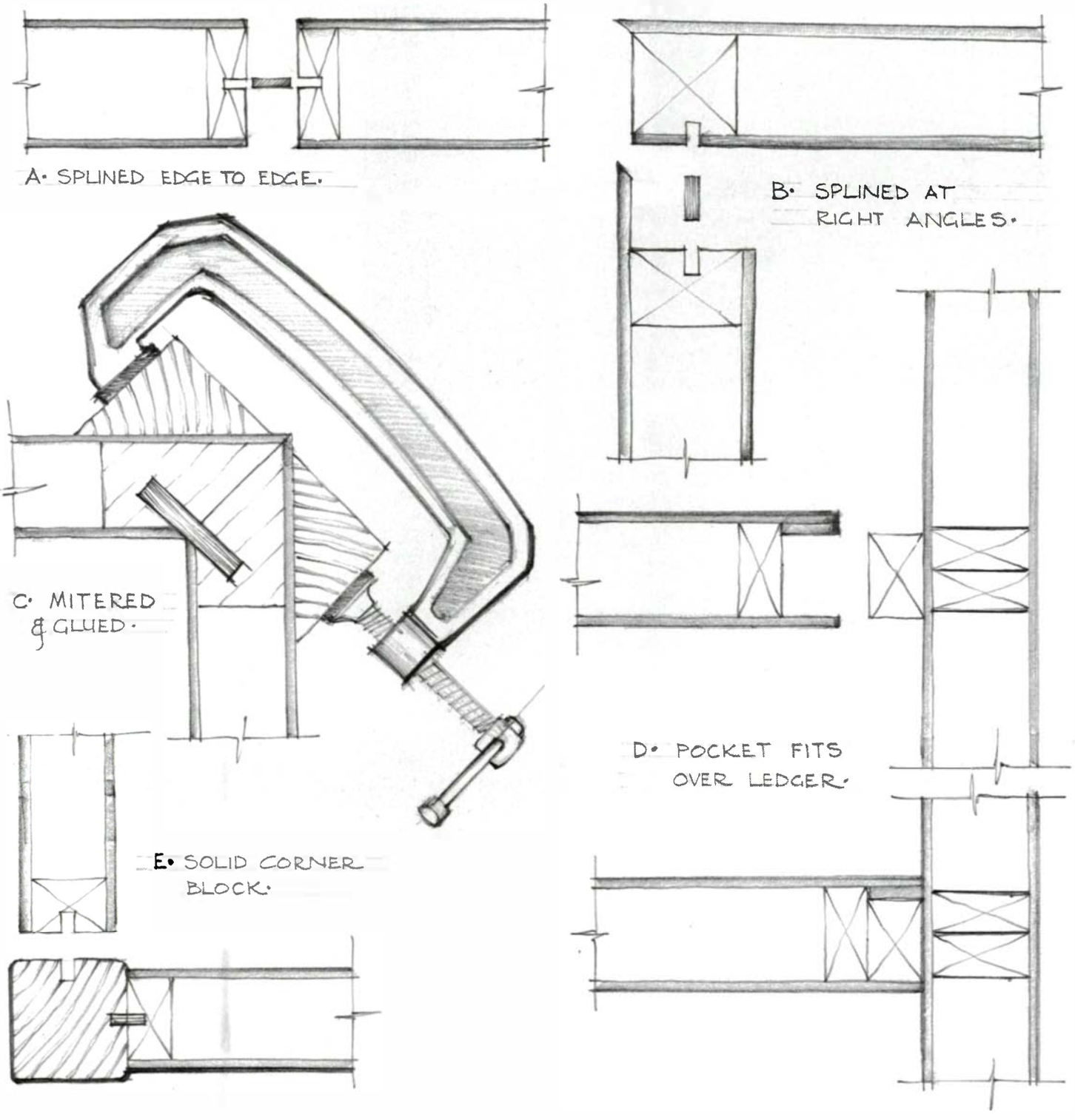
Joinery—The simplest way to join two torsion boxes edge-to-edge is to butt them together with glue. To keep the surfaces in line, use a loose spline or a Lamello spline (figure A). If you're in any doubt at all about the ability of the core to support the joint, double up the core stock in the joint area when you design the box.

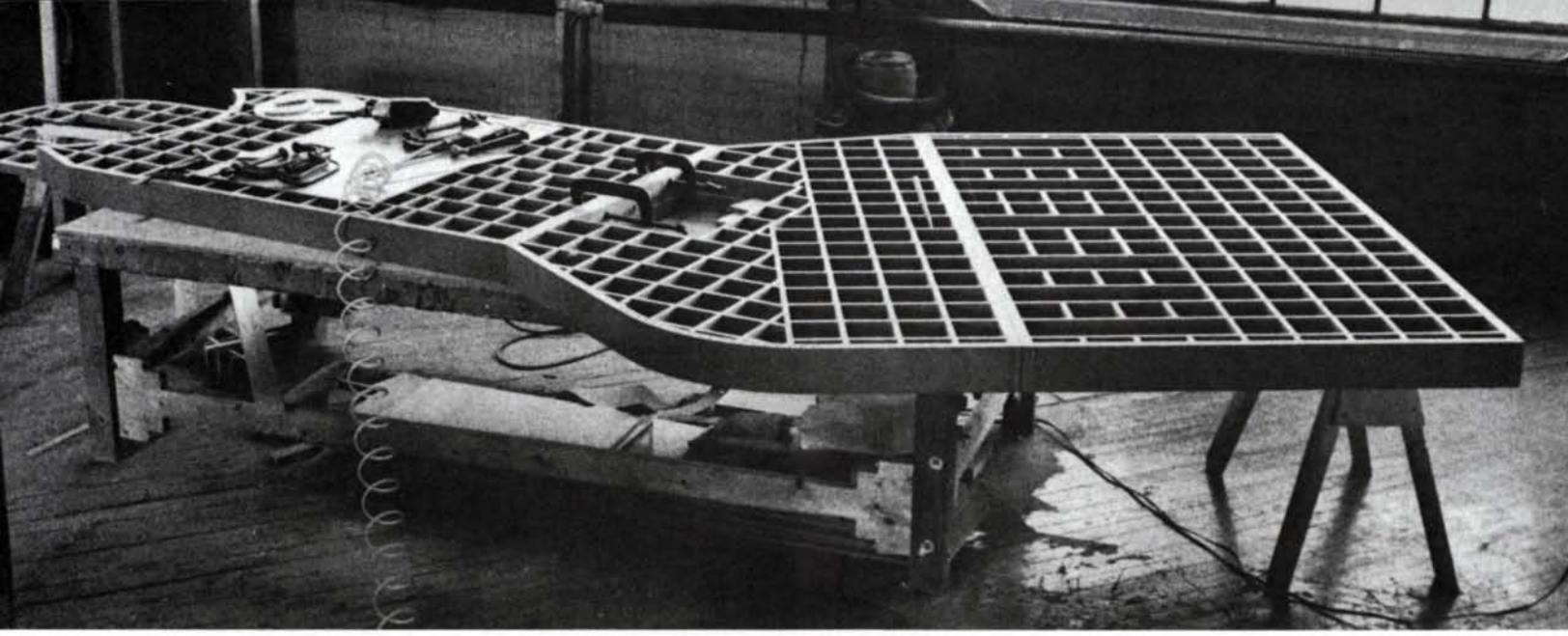
A butt joint can also be used to join two boxes with their skins at right angles, as shown in figure B, but usually the core stock must be made doubly thick at the joint. The result will probably be more attractive if the skin of one of the boxes overhangs its core, so it can conceal the joint. Splines can be used to register the parts.

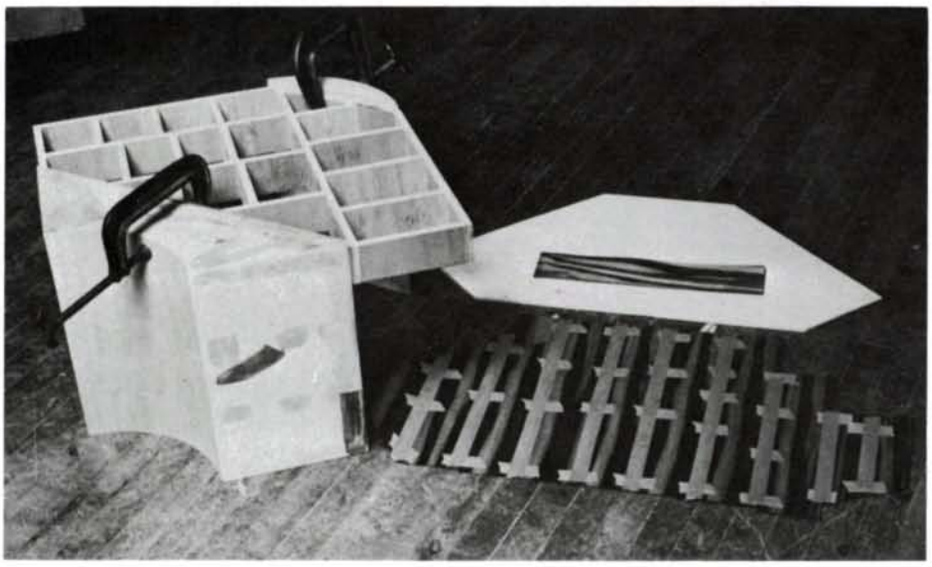
Alternately, the mating edges of the boxes can be mitered and glued (figure C), although once again enough stock must be provided for the miter cut when you are designing the box. The miter is especially strong in this application, since the core strips both present long-grain gluing surfaces, not a near end-grain surface as is usually the case in solid wood. Some form of register is vital, and again a spline will serve.

There's a slightly different strategy for forming a right-angled joint with one box in the middle of another, for example a bookshelf or a wall system. It's best to glue and screw a ledger strip onto the surface of one box (the screws going into a core strip), and to build a pocket into the other box (figure D). The pocket then slips onto the ledger strip. It can be glued in place for permanency, or screwed. The lippings on the boxes will conceal the ledger.

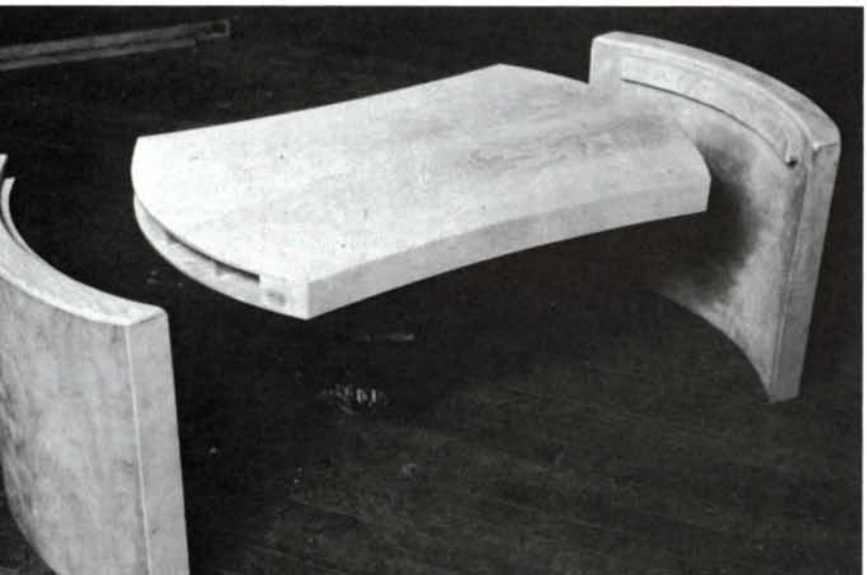
Finally, an intermediate piece of solid wood can always be used at a corner, with the edges of the two boxes glued directly to it, as shown in figure E. *(continued, p. 102)*







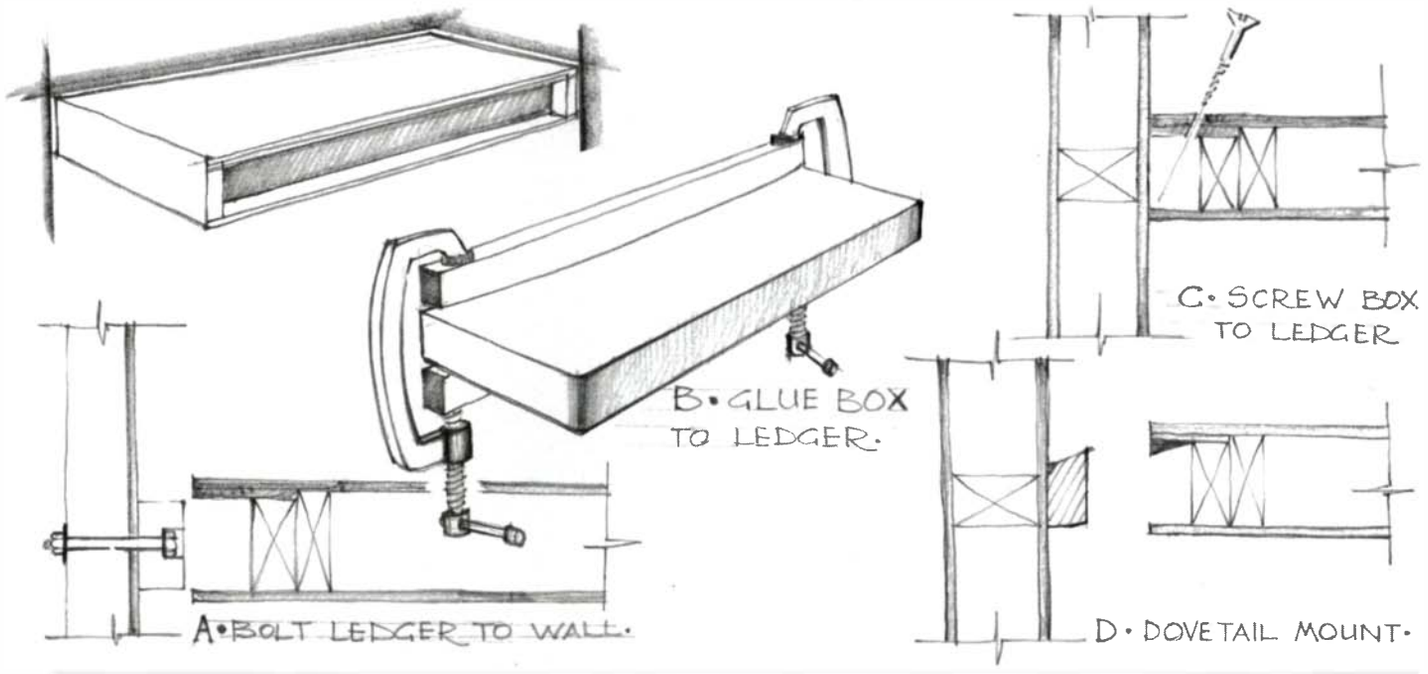
Some applications of the torsion box, from work done at Kirby Studios.
Top: Three-part core grid made of medium-density fiberboard is 4 in. thick, 6 ft. wide and almost 15 ft. long. Designer-maker Mike Garner skinned each grid with ash-faced plywood, to build a trading desk that had been commissioned by a commodities investment firm.
Center: This four-module coffee table, shown in two of its many arrangements, could hardly have been built in solid wood. As the photo at left shows, each module consists of three torsion boxes. The flat top is veneered with Macassar ebony, the curved verticals are painted. Designed and made by Jim Van Etten (© 1981).
Bottom: David Schwartz joined his table by screwing ledger strips onto the vertical torsion boxes. The strips plug into sockets constructed into the box that is the tabletop.

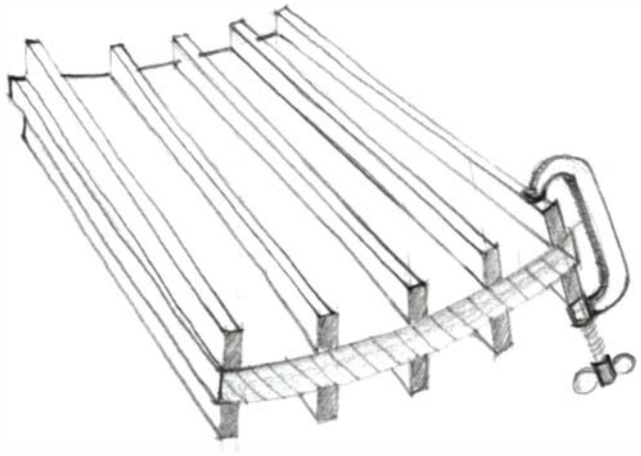


Wall mounting—One of the attractive characteristics of the torsion box is the way it can be fastened to a wall and made to hold considerable weight with no visible means of support. The usual method is to bolt or screw a ledger strip to the wall, and to construct the box with a pocket at its back edge that exactly fits over the ledger (A). Screws hold the box to the ledger. Thus the whole thing can be removed from the wall. Or the box can be glued to the ledger, in which case the fixture is permanent (B).

The ledger should be a piece of clean, knot-free wood, preferably hardwood. The way it's fastened to the wall depends on the load it is likely to bear—No. 10 screws 1½ in. into the studs will support a telephone, but seating or shelves for such heavy loads as a television set may require bolts right through the studs. Use 2-in. Rawlbolts into masonry walls. Where the shelf goes into a corner, ledgers should be attached to both walls. Screws through the top skin into the ledger hold the box in place, but if the top skin is ¼-in. plywood it had better be doubled or trebled inside the pocket. Gluing extra thicknesses of plywood inside the flange that fits over the ledger will minimize the risk of the screws tearing out under load (C). This thickness may also permit countersinking and plugging to conceal the screws.

When you wish to eliminate any visible trace of holding screws but still want the box to be removable, you can profile the ledger with a dovetail as shown at D.





Curved panels—It's relatively simple to make a torsion box that's curved in one plane, such as for a chair seat or back. The method is to draw the curve full-size, then to cut out as continuous strips the core elements that form the curve. Don't try to use short curved pieces between continuous straight pieces, for they would be impossible to align. The outside straight pieces should also be continuous and attached to the end-grain of the curved pieces. This will aid in alignment and will also keep the core from twisting before the first skin is applied. It's best to skin the convex side first—if the finish is to be leather or paint, the skin can be glued and stapled or nailed. If the skins have a show veneer already, they'll have to be glued with the aid of battens and clamps. The battens should be slightly cambered, say 1/16 in. for every 10 in. of length. Place the battens in pairs, one over the other with a core strip between. Hardboard between the veneer and the battens will spread the pressure and keep the skins from scalloping.

In sum—The torsion box ought to be thought of as a building block within a system. In fact, the torsion box is the counterpart in man-made sheet materials, of the frame-and-panel in solid wood. Both are systems that have developed in response to the dimensional instability of wood. Either system brings its own limitations and liberations, but these depend mainly upon the designer-woodworker's imagination. □

Current Work

And gallery dealings in Northern California

by Rick Mastelli

Galleries have become important marketing resources for a growing number of woodworkers. By helping display and promote work, maintaining a showroom, sales personnel and contact with the media, they give woodworkers more time in the shop. The exposure they provide can yield valuable feedback about how work is being received, particularly about its salability. Because they are showcases for new designs and techniques, galleries have also come to play a critical and inspirational role. Even if you never show in galleries, they are worth visiting, just to see what's up.

That's what I did in Northern California last summer. Besides encountering the noteworthy pieces of furniture pictured on the following pages, I discovered a consensus among owners about how woodworkers should deal with galleries.

If you take the gallery as a resource for studying contemporary design and technique, you should introduce yourself and get permission before you start opening drawers. Most galleries expect the work they're showing to be touched, but they're most anxious to avoid damage. Connect with the people before you start poking into the furniture.

If it's gallery representation you're seeking, first assess yourself and your work. Most galleries take 40% of retail, which means they mark your price up by two-thirds. Can your work support this markup? Can you afford the base price that will hold the retail price where you think it should be? Dan Gordon, co-owner of the Signature Gallery in San Francisco, figures woodworkers should have been in business three or four years before they can expect space in his showroom. "The first year you should be concentrating on your craft," Gordon says, "the next two on design and the next two after that on business. It doesn't make sense to pursue gallery representation until you know what you're doing and where you want to go with your work.... Are you interested in one-of-a-kind commissions, or do you want to do limited production? Are your pieces the beginning of a kind of thing you want to do more of, or do they represent past explorations?"

When you know you want to try selling through a gallery, do some research. Visit the gallery, see if your work belongs there. Talk to other craftsmen who've shown and sold there (the gallery should provide references). If you decide to use the gallery, call for an appointment. Nothing could be worse than to drive up unannounced on a busy Saturday afternoon with your truck full of furniture. Most galleries, though, do want to see an actual piece or two, in addition to photographs. But photographs are critical. "I'm shocked at how many woodworkers don't photograph their work," said Debbie Johanson, director of a woodworking gallery in Sausalito. "Sure it can be expensive, but what about trading a piece with a photographer for his services? Showing a portfolio provides a context for a particular piece, and helps establish the confidence to buy it. It's also the way to secure commissions."

Signature Gallery now asks its woodworkers to provide two sets of photos, one for an individual portfolio of the craftsman's work, the other for a gallery portfolio that's organized by types of furniture. A client looking for a dining table can review all the possibilities in one book, then turn to a collection of work by the woodworker who interests him most. Such presentation can produce unexpected sales. Galleries also use your photos for promotion in newspapers and magazines. *Fine Woodworking* regularly receives publicity packages from galleries, and these often lead to coverage in our pages.

Staff

After representing Bay Area woodworkers for seven years from a cozy out-of-the-way shop in San Francisco, last summer the Signature Gallery moved to this stylish, white-walled space on Pacific Ave.

Lastly, your gallery package should include a resume that discusses the ideas behind your work. A gallery acts not only as a consigning merchant, but also as your agent. You must provide means to understand and appreciate your work if the gallery is to best represent you. This includes projecting a comfortable confidence in what you make, and establishing cordial relations with gallery people. To attract clients, they will be talking as much about you as about your work. According to Waleen Eveslage, craft director of Los Robles Gallery in Palo Alto, "People don't buy this sort of furniture for the work alone. It's a way of investing in the character of the maker, and the presentation of the piece is part of that character. The gallery can do little more than the artist gives us means to do."

There are of course numerous other concerns in doing business with a gallery: the specifics of its policies, the nature of its contract, the problems of shipping, insuring and guaranteeing work. A booklet worth reading is *The Artist-Gallery Partnership: A Practical Guide to Consignment,* by Susan Melon and Tad Crawford. It's available for $4.50 from the American Council of the Arts, 570 Seventh Ave., New York, N.Y. 10018. For an annotated list of craft galleries, see *1980 Craftworker's Market,* edited by Lynne Lapin (Cincinnati: Writer's Digest Books, 1979; 684 pp. $11.95).

From San Rafael, Calif. . . .

Bruce McQuilkin, 34, is a versatile furnituremaker, plying his talents in various styles and forms, from tambour desks in the California round-over style to geometrically crisp wood-and-glass tables. This rosewood desk with gold-plated trim was on display at Signature Gallery. Maybe it's the regular curve of the top, tastefully controlled by its rim, maybe it's the richness of the materials, but the desk is elegant, even though it looks only recently landed. The workmanship is respectable, including a tongue-and-groove joint between the rim and the top that allows for expansion and contraction, and internal wedges that thicken the flaring legs while avoiding the unsightly feather edge of a scarf joint. The price is $4,500. Photos: Joel Schopplein.

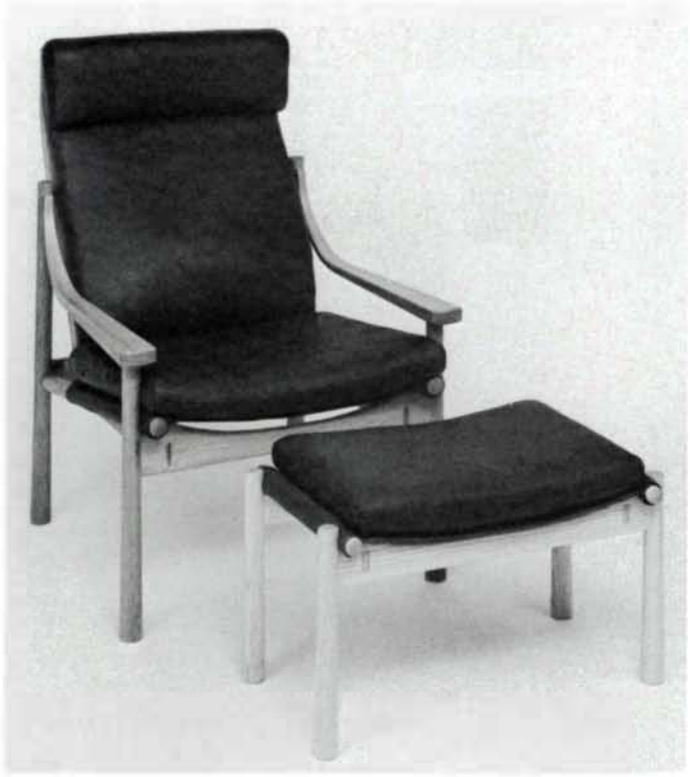


Photo above: David Scherrer; Photo below: Joel Schopplein.

From Bellingham, Wash. . . .

Michael Strong, 28, is a former student of architecture who prefers solving design problems in the more personal scale of furniture. The influences of figure drawing, particularly of bone structure, and of his study in Sweden of limited-production methods, can be seen in this white oak lounge chair. Strong sold two of the $836 chairs at the Pacific States Craft Fair during August, and is now looking for a manufacturer to produce them. The neatest thing about the chair is its independent and adjustable back, which rests in notches in the lower frame and pivots on a crosspiece between the back legs. The support it provides is capital.

From Mendocino, Calif. . . .

This consummately constructed picnic table by Ben Finkelstein, 38, is typical of the sound, simple work on display at the Guild Store, the outlet of the Mendocino Woodworkers Association. Setting out to build a fine piece of outdoor furniture, Finkelstein used old-growth redwood, harder and more durable than what is usually available. The spaces in the top, each board of which is screwed only in its center to the base and to the breadboard ends, accommodate wood movement and allow rainwater to drain. Water-resistant urea-resin glue and nine coats of marine varnish add to the weatherability of this $1,200 table. Photo: © 1981 Nicholas Wilson.

From Mendocino, Calif. . . .

This pigeonhole desk in two subtly different species of rosewood, is by Craig Marks *(FWW #29, p. 42)*. It was on display at Signature Gallery, priced at $5,835. An exquisite blend of traditional forms that are reminiscent of both Louis XV and Art Nouveau, it is nevertheless contemporary woodworking—the most refined piece I saw in California. The play of hard edge along compound curves, the smooth transition of shaped skirts into the veneered underside, the continuity of the figure across the sculpted drawerfronts, all combine to give the desk taste and unity. Photos: Joel Schopplein.

Beyond the bowl

Light, heavy. Smooth, rough. Thick, thin. Bare wood, polished lacquer. Inside, outside. Dark, light. These four bowls span umpteen pairs of opposites along the fringes of the woodturner's craft (or art). Rear: *Amaran Krater* by Mark Lindquist ($1,800) explores in mahogany some surfaces and textures besides the usual smooth. Center left: Holly bowl by Richard Raffan ($65) was turned and sanded while green to a perfect hemisphere with ⅛-in. thick walls, then allowed to dry boat-shaped. Center right: Bowl by John Nigh ($90) is a lump of walnut just barely excavated, a protobowl. Front: *Pearl II* by Giles Gilson ($250) is mahogany sprayed outside with white and candy-blue opalescent automobile lacquer; on the inside it's flocked with black felt. The only way you know it's wood is by looking at its bottom.

More about the decorative bowl on p. 54.

Photo: White Light Studios. Bowls by Lindquist and Nigh courtesy The Craftsman's Gallery, Scarsdale, N.Y.